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CRD Responsibilities Outlined in Treaty Safeguards Program

ASAP MEET at Fort Belvoir, Va., brought together the top R&D leaders, including (left to right) Lt Gen Dwight E. Beach, CG, USACDC; Dr. Charles C. Lauritsen, ASAP member; Willis M. Hawkins, ASA (R&D); Dean Morrough P. O'Brien, ASAP chairman; and Lt Gen W. W. Dick, Jr., Army CRD.

General Staff responsibility of the Chief of Research and Development to implement provisions of the Joint Chiefs of Staff with respect to the Limited Nuclear Test Ban Treaty of 1963 is outlined in a new "Army R&D Treaty Safeguards Program."

Lt Gen William W. Dick, Jr., has set forth specific actions to be accomplished by the Army Materiel Command, the Combat Developments Command, the Corps of Engineers and the Army Medical Service, mainly in the area of nuclear weapons effects research and testing.

Senate ratification came only after the President, the Secretary of Defense and the Joint Chiefs of Staff had provided assurance that the treaty would not reduce the nuclear superiority of the United States. The Joint Chiefs of Staff stated:

"Having weighed all of these factors, it is the judgment of the Joint Chiefs of Staff that, if adequate safeguards are established, the risks inherent in this treaty can be accepted in order to seek the important gains which may be achieved through a stabilization of international relations and a move toward a peaceful environment in which to seek resolution of our differences. . . .

"These safeguards include:

"A. The conduct of comprehensive, aggressive, and continuing under-

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Eight Ad Hoc Group Reports Highlight ASAP Meeting

Submission of reports by eight Ad Hoc Groups highlighted the Army Scientific Advisory Panel meeting Feb. 14 at Headquarters, U.S. Army Combat Developments Command, Fort Belvoir, Va., with Lt Gen Dwight E. Beach as host.

Studies completed recently or still in progress by the Ad Hoc Groups are concerned with some of the most critical problems confronting Army research and development. Seven of the groups were appointed in mid-1963 by joint request of Dr. Finn J. Larsen, then Assistant Secretary of the Army (R&D), and General Beach, then Chief of R&D.

Three of the reports were complete as this publication went to press, but those on the White Sands Missile Range and on Mobile Energy Depot

(Continued on page 4)

Featured in This Issue . . .

Hornig Takes Over as No. 1 Federal Science Leader

Dr. Donald F. Hornig, successor to Dr. Jerome B. Wiesner's four titles as the No. 1 leader in Federal science and technology, is 44, a Harvard graduate, a former Fulbright research scholar at Oxford, and the proud parent of four children.

When Dr. Wiesner, formerly director of the Research Laboratory for Electronics at Massachusetts Institute of Technology, resigned Government duties to return to MIT Feb. 1 as Dean of Science, Dr. Hornig was sworn into responsibilities for which he had been understudying for several weeks.

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Dr. Donald F. Hornig

Army R&D Newsmagazine

Vol. 5, No. 3 March 1964

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Purpose: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among the widely dispersed and diffused Army R&D activities; to maintain a closer link from top management through all levels to scientists, engineers and technicians at the bench level; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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Munitions Command Emphasizes Reliability Factors

By Major General F. A. Hansen

Commanding General, U.S. Army Munitions Command

Maj Gen Floyd A. Hansen

Consideration of reliability with respect to items of ammunition presents several unique aspects, all of which result in the Munitions Command philosophy of giving emphasis first to safety and second to quality—and only then to other pressures under which we work.

Ammunition items are "one-shot" items. This is true of the entire range of ammunition items, whether containing explosive, nuclear, chemical or biological materials, or armor-piercing or other inert type projectiles, from complex warhead sections for guided missiles and large rockets through ammunition for small arms, i.e. rifles, pistols, and machineguns.

In contrast to most other military items, our concern is not with the "wear-out" type of failure in continuous usage. Rather, it is with an ability to survive the stockpile storage environment over periods of as much as 20 years and then to perform one time in accordance with design intent. We design to minimize requirements for performance of any maintenance operations following issue of the item from the storage depot to the field. Our intent is to provide a round of ammunition which needs only be unpackaged to be ready for use.

A second element of uniqueness requires that ammunition reliability be considered in the dual aspects of design safety or "premature" reliability and of required performance of "dud" reliability. In the first instance, we are concerned that the catastrophic effects of the ammunition are not felt except at the target of choice; in the second, that there exists a high degree of probability that design performance will be properly achieved at the target of choice. The use of the word catastrophic applies to both instances.

Imagine, if you will, the implications of a multi-kiloton nuclear premature explosion of an air defense weapon at a launch site in the heart of a metropolitan center. Equally severe, from a purely tactical standpoint, would be the failure of a similar multi-kiloton weapon to destroy the target of choice—perhaps an enemy troop concentration; perhaps a strategic defile through which an enemy advance must proceed.

Finally, ammunition items are generally without commercial counter-part and, with the exception of limited training usage, live in stockpiled storage. Being "one-shot" items, the items are destroyed in performance tests. These facts severely limit the experience available to us against which to assess reliability of our items. This is further complicated by the fact that reliability requirements, both dud and premature, are expressed at relatively high risk levels of 1/100,000, 1/10,000, 1/1,000, etc.

Orders of magnitude like those obviously are not going to be proven by tests of costly complete end items. Rather, our philosophy is one of designing for reliability through use of proven components and the redundant arrangement of these components where necessary. By laboratory testing of components and by combining results of such component tests, we attempt to demonstrate that designs have an inherent capability of meeting expressed reliability requirements. It is recognized that some very critical assumptions underly this approach.

In particular, it must be assumed that non-interdependence of components, as assumed in laboratory tests, will hold true in the real set of environment the end item must survive. Proof requires tests of complete end items in real environments. Operation of critical components is measured in time and in appropriate amplitudes by telemetering devices. Successes in such tests, while not proving attainment of the stated high levels of performance probability, do demonstrate that requirements are not refuted by available experience.

That basic philosophy is applied to all phases of the life-cycle of ammunition items, i.e., design and development, production and procurement, and stockpile. In the last phase of the life-cycle, ammunition is again unique. Because we do not obtain performance information on the bulk of the material in long-term

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PRESIDENT JOHNSON'S CHALLENGE TO FEDERAL MANAGERS

The *Civil Service Journal*, official publication of the U.S. Civil Service Commission, carried a message from President Johnson on page 1 of the January-March 1964 issue. Secretary of Defense McNamara is preparing an article on defense establishment management for publication in the April-June issue of the Journal. The President's message follows:

I am addressing this message to Federal managers through the *Civil Service Journal* because I need your help.

Our Nation has many goals and commitments. We must meet these goals and commitments without an overdraft on the Nation's resources. We can do it only it we get full value for every dollar.

Many people outside Government think we are daring spenders. Let's show by our record that we are, in fact, sparing do-ers.

I challenge all of you to engage in a competition for greater economy and efficiency in Government operations. This is a competition among Federal organizations as well as among individuals, and its true goal is accomplishment of all the Nation's essential business.

THERE IS NO INTENTION that we grapple barehanded with our problem. Government uses some of the most advanced methods and equipment to accomplish its work, and properly so. Economy does mean, however, that the manager must:

Make hard judgments in setting work priorities.

Challenge the ingenuity of the people in his work force —and reward them for it.

Strive unceasingly for the shorter form, the better way, the more direct method.

The decisions formulated by career managers have a make-or-break impact on overhead costs. There are opportunities for major economies in such areas as organization structure, personnel ceilings, travel, space, and contracts. In many cases a revolutionary approach to our management problems may provide the best solution. Let's demolish what is antiquated, rebuild only what serves a continuing purpose, and clear some ground for brand new methods.

IN THESE ENDEAVORS every member of our working team should play a part. We must utilize incentives and provide recognition and reward for those who answer the call. You can depend upon my personal interest in seeing that this is done.

Hornig Takes Over as No. 1 Federal Science Leader

(*Continued from page 1*)

Since 1960 he has been a member of the President's Science Advisory Committee, being appointed first by President Eisenhower and reappointed by President Kennedy. His new job makes him chairman of that group.

Other Wiesner titles to which Dr. Hornig was elevated over a period of several days late in January are: Special Assistant to the President for Science and Technology, Director of the Office of Science and Technology, and Chairman of the Federal Council for Science and Technology.

Graduated from Harvard with a B.S. degree in 1940 and a Ph. D. three years later, Dr. Hornig was awarded a Guggenheim grant and a Fulbright scholarship for research at St. John's College, Oxford University, England, in 1954-55. During that period he was appointed the first Bourke overseas lecturer by the Faraday Society of London.

From 1956 to 1961 he was a member of the Physics Advisory Committee, Office of Scientific Research, U.S. Air Force, and in 1957 was elected to the National Academy of Sciences.

Two years later he was appointed to the NAS Space Science Board, and in 1960 served on the Kennedy Task Force on Space to help formulate policy. In 1962-63 he was in the delegation headed by Dr. Hugh Dryden which negotiated the agreement with the Soviet Union for cooperation in certain space activities.

After receiving his doctorate, he spent a year as a research associate at the Woods Hole Oceanographic Institution, then served from 1944 to 1946 as a group leader at the Los Alamos Laboratory, and found time to perform as president of Radiation Instruments Co. from 1945 to 1947.

Dr. Hornig was elected to the executive committee of the Division of Physical and Inorganic Chemistry, American Chemical Society, in 1954. He is a Fellow of the American Physical Society, the American Academy of Arts and Sciences, and the Faraday Society, and has published about 70 papers in leading professional journals.

Appointed to the Brown University staff as assistant professor in 1946, he rose to full professor by 1951 and a year later became associate and then acting dean of the Graduate School. He was chairman of Project Metcalf and director, Metcalf Research Laboratory, Office of Naval Research, in 1951-52.

Maj Gen Betts Designated Special OCRD Assistant for Nike X Threat Analysis Study

Maj Gen Austin W. Betts was assigned to the Office of the Chief of Research and Development Feb. 7 as special assistant for a Nike X Threat Analysis Study, and is located in Room 3E 434, the Pentagon.

Maj Gen Austin W. Betts

Since 1961 he has served as director of Military Applications, Atomic Energy Commission, Germantown, Md. From 1959 to 1961, he was military assistant to the Director of Defense Research and Engineering, during which he served one year as Director of *ARPA*.

General Betts was born in Westwood, N.J., Nov. 22, 1912, and was graduated from the United States Military Academy in 1934. After assignments in the Artillery and the Corps of Engineers, he received an M.S. degree in 1938 from Massachusetts Institute of Technology.

During World War II he trained new battalions and planned construction of B29 air bases in India and China, earning the Legion of Merit. His career in research and development began in 1945 at Los Alamos, N. Mex., where he later became associate director, scientific laboratory.

Subsequent assignments made him chief, Atomic Energy Branch, Research and Development Division, G–4, Department of the Army, and executive to the Chief of Research and Development in 1952. After graduating from the Industrial College of the Armed Forces in Washington, D.C., he was ordered to Headquarters, U.S. Army, Europe in 1955 as chief, Combat Developments Branch.

CRD Responsibilities Outlined in Treaty Safeguards Program

(Continued from page 1)

ground nuclear test programs designed to add to our knowledge and improve our weapons in all areas of significance to our military posture for the future.

"B. The maintenance of modern nuclear laboratory facilities and programs in theoretical and exploratory nuclear technology which will attract, retain and insure the continued application of our human scientific resources to those programs on which progress in nuclear technology depends.

"C. The maintenance of the facilities and resources necessary to institute promptly nuclear tests in the atmosphere should they be deemed essential to our national security or should the treaty or any of its terms be abrogated by the Soviet Union.

"D. The improvement of our capability, within feasible and practical limits, to monitor the terms of the treaty, to detect violations, and to maintain our knowledge of Sino-Soviet nuclear activity, capabilities and achievements."

General policy guidance by the Department of the Army states that the safeguards will be fully implemented within Army resources and, if these resources are inadequate, appropriate recommendations will be forwarded.

The Chief of Research and Development is responsible for implementing safeguards A, B and C, except for operational nuclear tests which are the responsibility of the Assistant Chief of Staff for Force Development.

The requirement to implement the safeguards resulted in a reorientation of the nuclear weapons effects research program, particularly within the Department of Defense.

While the Atomic Energy Commission is responsible for developing nuclear weapons, the Department of Defense is charged with determining the best methods to employ the weapons and to defend against them.

Consequently, the treaty has had a greater impact on the Department of Defense than on the AEC. The AEC can continue development testing underground, but the DoD has many technical problems in conducting effects tests underground. Army needs for nuclear weapons effects research are based on three functions:

- The conduct of tactical nuclear warfare on the battlefield.
- The development of an antiballistic missile defense system.
- Development of protective structures by the Corps of Engineers.

Tasks being accomplished to assure that the treaty does not reduce capability of the Army to accomplish these functions are discussed below in conjunction with the safeguards.

SAFEGUARD A — Underground Test Program. Tests are being conducted at the Nevada Test Site, one of the largest to date by the AEC being a 200 KT (approximate) detonation at a depth of 2,400 feet.

The Army Materiel Command and the Corps of Engineers have responsibilities to support the Defense Atomic Support Agency in the conduct of underground effects tests. Army in-house laboratories have a need to develop ingenious methods of determining atmospheric effects by tests.

The U.S. Army Engineer Nuclear Cratering Group at the Lawrence Radiation Laboratory, Livermore, Calif., is making plans and preparations for cratering tests to provide data on use of atomic demolitions for excavation.

SAFEGUARD B — Army Nuclear Weapons Effects Laboratory Program. Termination of atmospheric tests means that most of the Army requirements must be satisfied in the laboratory by analytical methods or by use of facilities which simulate effects of a nuclear detonation.

The Department of Defense program in weapons effects research is funded and coordinated by the Defense Atomic Support Agency, and the Atomic Office of the Office of the Chief of Research and Development monitors the program for the Army.

Laboratories of the Army Materiel Command, the Corps of Engineers and The Surgeon General perform this research in the major areas indicated:

Eight Ad Hoc Group Reports Highlight ASAP Meet

(Continued from page 1)

Concepts (the latter explained in the Dec.-Jan. issue, page 20) are classified.

Dr. Hector R. Skifter, president of Airborne Instruments Laboratory, Division of Cutler-Hammer, Inc., of Deer Park, Long Island, N.Y., headed the Ad Hoc Group on In-House Laboratories.

The White Sands Missile Range Ad Hoc Group was headed by Dr. Charles C. Lauritsen, professor of physics, California Institute of Technology, Pasadena, Calif. Dr. Harold C. Weber, chief scientific adviser, Department of the Army, chaired the Mobile Energy Depot Concepts Ad Hoc Group. The other units and their chairmen are:

Forward Area Air Defense Weapons. Dr. William C. Tinus, vice president of Bell Telephone Laboratories, Whippany, N.J.

Antitank Weapons. Richard S. Morse, former Assistant Secretary of the Army (R&D), now chairman of Cryonetics Corp., Northwest Industrial Park, Burlington, Mass.

Scientific Personnel. Dr. John E. Vance, professor of chemistry, New York University, New York City.

Army Aircraft R&D. Charles H. Zimmerman, chief engineer, U.S. Army Materiel Command, Washington, D.C.

Tactical Communications. Don Fink, general manager of the Institute of Electrical and Electronics Engineers, Lenox Hill Station, New York City.

Assistant Secretary of the Army (R&D) Willis M. Hawkins headed a list of dignitaries attending the Feb. 14 meeting that included all top-ranking R&D leaders in the Washington metropolitan area.

The morning session was devoted to a comprehensive briefing on the U.S. Combat Developments Command, its organization, mission, activities, and plans for the future. Lt Gen Dwight E. Beach, CG of the CDC, made the introductory presentation.

Reports of the Ad Hoc Groups in the afternoon reflected the status of implementation on the White Sands Missile Range study and the Mobile Energy Depot Concepts study.

Maj Gen Leslie E. Simon (USA, Ret.), Army Scientific Advisory Panel member, and Maj Gen Frank H. Britton, Director of R&D, Army Materiel Command, pause for chat during recent meeting of Panel at Fort Belvoir, Va.

Ballistics Research Laboratories, Aberdeen Proving Ground, Md.—Air blast, high altitude ionization, and integrated effects on reentry vehicles.

Nuclear Defense Laboratory, Edgewood Arsenal, Md.—Fallout, shielding, and instruments to measure initial radiation.

Harry Diamond Laboratories, Washington, D.C.—Transient radiation effects on electronic systems and electromagnetic effects on fuzes.

Picatinny Arsenal, Dover, N.J.—Radiation effects on explosives and satellite and reentry vehicle vulnerability (kill mechanisms).

Electronics R&D Laboratory, Fort Monmouth, N.J.—Transient radiation effects on electronic components and the effects of nuclear detonations on HF communication systems.

Engineer R&D Laboratories, Fort Belvoir, Va.—Blast effects on fortification and electromagnetic pulse effects on electric power systems.

Waterways Experimental Station, Vicksburg, Miss.—Effects on protective structures, underwater effects.

Walter Reed Army Institute of Research, Washington, D.C.—Biomedical radiation effects on personnel.

Development of Test Facilities. As a result of the ban, major emphasis is on use, development and procurement of test facilities that simulate weapons effects. Some of these in existence or being planned include:

Nuclear Radiation—TRIGA (water moderated) pulse reactor, Harry Diamond Laboratories; this facility has been in operation for two years and the core is being modified to increase neutron and gamma output. MOLLY G (bare critical assembly) pulse reactor, White Sands (N.Mex.) Missile Range; construction of this reactor is expected to be completed this summer. Pulse reactor at Aberdeen Proving Ground, Md., construction of which will commence this summer. Tandem Van de Graaf Accelerator at the Nuclear Defense Laboratory is being procured.

Blast Effects—Shock tubes at Ballistics Research Laboratories, APG. Blast Load Generator, Waterways Experiment Station, is now being calibrated to test effects of shock on protective structures.

Thermal Effects—Thermal furnace at the U.S. Army Natick (Mass.) Laboratories is now in operation.

Electromagnetic Pulse Effects—The Engineer R&D Laboratories are planning to procure an EMP simulation facility with DASA requested FY 1965 funds. An inventory of Army capabilities to conduct weapons effects research is being made by the Atomic Office, Office of the Chief of Research and Development.

SAFEGUARD C — Atmospheric Test Preparations. When the Soviet Union broke its test moratorium agreement with the U.S. in September of 1961, criticism developed because the U.S. was not ready to conduct atmospheric tests until the following April. To prevent the U.S.S.R. from again seizing an advantage, preparations are being made to insure that the U.S. will be able to initiate atmospheric and underwater testing within two to three months after a decision.

The Government policy is that preparations will insure that the Atomic Energy Commission proof and developmental tests, mainly high-yield tests, and the Department of Defense tests of nuclear weapons delivery systems can be executed within two to three months, and the DoD effects tests within six months. Effects tests require a great amount of joint planning and preparation.

Army laboratories are participating by planning experimental projects, developing instrumentation, and preparing missiles and rockets. The Army recognizes that this program will be a major task for the laboratories and will require continued effort to attain and maintain the proper readiness level.

Joint Action Set on Air-Launched Non-Nuclear Ordnance

Proposed terms of reference have been drafted for a Tri-Service coordinated program in Air-Launched Non-Nuclear Ordnance Development, following a Feb. 19 meeting of Army, Navy and Air Force top-level leaders.

Chief of Research and Development Lt Gen W. W. Dick, Jr., Deputy Chief of Naval Operations (Development) Rear Adm C. T. Booth and Air Force Deputy Chief of Staff for R&D Lt Gen James Ferguson headed the group of senior officers that convened at the Pentagon. General Dick was the host officer.

Discussions were held on current activities of each of the Services in the field of air-launched non-nuclear Ordnance. Possibilities were considered for closer coordination of effort, in line with a series of meetings held in recent weeks by the R&D chiefs to effect improved liaison. Avionics is scheduled as the theme of their next monthly meeting.

The proposed terms of reference for Air-Launched Non-Nuclear Ordnance Development envision "a more effective use of existing in-house development facilities, through management and coordination, to provide the required weapons for all Services. A significant problem associated with joint development is the lack of agreement on standardized weapons effectiveness and vulnerability criteria."

The scope of the joint effort would provide for Tri-Service coordination at the staff and technical working level of the individual air-launched non-nuclear Ordnance RDT&E programs, including the Five-Year Plan of each Service. Included would be all basic research as well as individual weapons programs which apply to the tactical air attack mission.

As proposed, a Tri-Service group would conduct a detailed review of Service in-house and contract programs to preclude duplication of R&D effort. Exchange of documents and other information is planned.

The coordinating group, as proposed, would hold timely meetings to insure joint fiscal and force structure planning for development programs of mutual concern. It would "serve as an informal source of R&D information to the user command of each Service to facilitate the generation of valid concepts of use (tactics) at the earliest possible date, and, vice versa, to obtain informal operational viewpoints as guidance to R&D effort."

BRL Win 2 Safety Awards

The National Safety Council Award of Honor and the Army Materiel Command Award of Merit for Safety were presented to the U.S. Army Ballistic Research Labs, Aberden P.G., Md., for 1,806,720 manhours worked in FY 1963 with only one lost-time accident. Holding awards are Col Charles D. Y. Ostrom, Jr., CG, BRL, and Harold G. Buchanan, BRL safety officer. Over 1,000 employees, with 750 scientific and professional men in explosives and chemical research, work at BRL.

Picatinny Develops Hot Gas Control Valve For Added Thrust in Liquid Rocket Engines

A hot gas control valve which makes possible the highly efficient Second Injection Thrust Vector Concept (SITVC) system in liquid rocket engines is reported among recent developments at Picatinny Arsenal, Dover, N.J.

Experimental work by the Arsenal's Liquid Rocket Propulsion Laboratory (LRPL) has resulted in a high-performance, lightweight system simpler in design than the mechanical guidance in the present nozzle system. Picatinny researchers said full exploitation of the highly efficient SITVC system for advanced Army missile applications has been hindered by lack of a satisfactory valve.

A conical-shaped pintle in the new valve is positioned by a servo actuator to provide linear variation of the flow control area within the entrance portion of a converging-diverging nozzle.

The valve has withstood erosive effects of high-velocity gas flow at temperatures exceeding 5000° F. This was accomplished by the composite use of dissimilar heat sink materials, ablative and ceramic insulators, and refractory metals.

An intensive experimental program completed recently tested the valve as an integral component of a rocket engine. Combustion gases were bled from the thrust chamber of a liquid bipropellant rocket engine through an ablative duct and vented to the atmosphere via the valve.

The valve successfully withstood four test firings, totaling 48 seconds of accumulative operation over a wide range of flow throttling conditions without experiencing any significant damage to critical components.

The proportional control offered by this valve provides a wide range of side-thrust vectoring forces, thus allowing the guidance system a greater degree of accuracy and flexibility in directing the missile to its target, the Picatinny report said.

LRPL has engaged in experimental work in the field of secondary injection thrust vector control since 1954. Research presently is under the direction of J. J. Canavan, chief of the Propulsion Engineering Section, W. Lehman, program manager, and F. Crommie, project engineer.

Early studies involved the use of ambient and moderately hot gases for direct injection at the exit cone of both liquid and solid rocket propulsion engines. The results of these tests demonstrated the feasibility and effectiveness of an oblique shock wave system for missile control and provided the groundwork for further state-of-the-art-development.

GIMRADA Redesigns Military Mapping Units

The U.S. Army Engineer Geodesy, Intelligence and Mapping R&D Agency, Fort Belvoir, Va., is modernizing two sets of equipment now used in establishing basic geodetic control for military mapping.

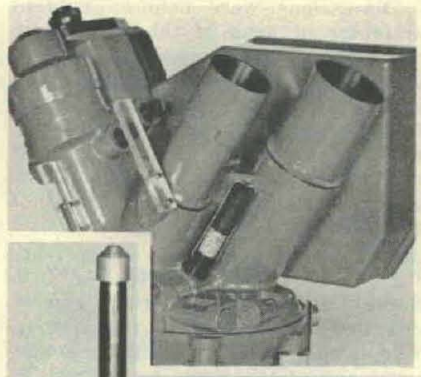
The objective is lightweight, easily operated and maintained automatic position survey equipment which can provide precise astronomic position information with high reliability under field conditions.

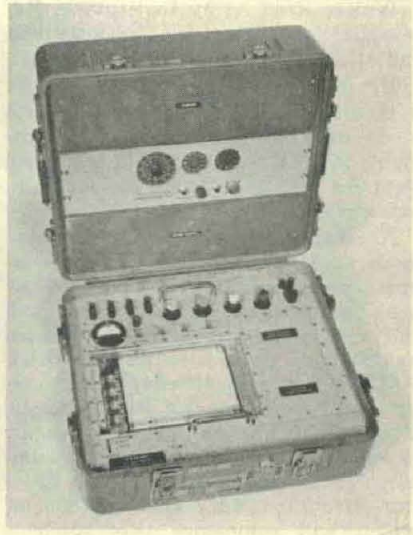
Work to date has resulted in the design and fabrication of a new 60 degree pendulum astrolabe with electronic transit detector, a time signal receiver, an electronic chronometer and an astronomic data recorder.

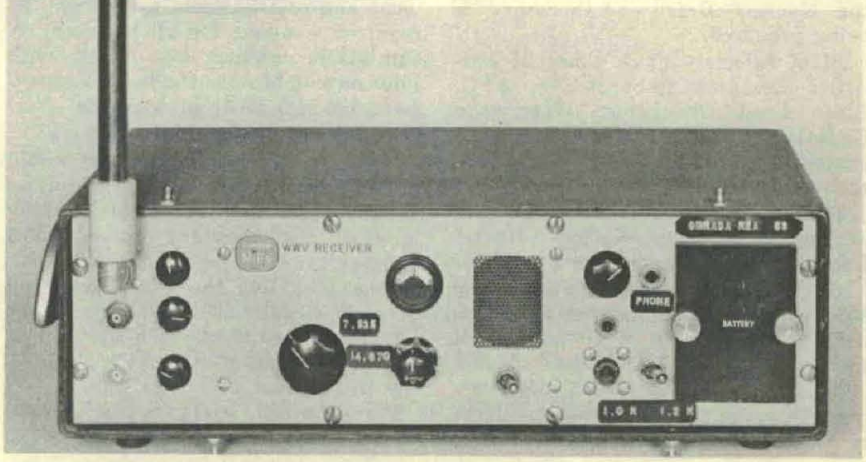
The improved astrolabe with transit detector is a fixed altitude instrument used to determine the instant in time that a celestial body attains an apparent given altitude. Light rays from a star pass through the objective lens assembly of the observation telescope and are reflected to the reticle by a flat, wire-suspended horizontal mirror.

The transit "tics" produced by the astrolabe are graphically recorded by the data recorder, as are the high-frequency time tics of the radio receiver, and the local time tics of the chronometer. Astronomic position can thus be determined to second-order accuracy.

LEGEND for new Art for new page 7. Geodetic and mapping equipment under modernization at Fort Belvoir, Va., includes: top left, new 60° pendulum astrolabe with electronic transit detector; top right, electronic chronometer and data recorder; bottom, high-frequency radio receiver.







OCRD Service Indicated As Training Ground for Generals by New Listing

Four of the 20 nominees for promotion to major general and six of the candidates for brigadier general approved by President Johnson Feb. 3 have been or are currently assigned to the Office of the Chief of Research and Development.

Col Victor W. Hobson, on the B.G. list, is serving as chief of the Programs and Budget Division. Col Edmund L. Mueller was chief of the Environmental Sciences Division in the early days of the U.S. Army Research Office and was later chief, Support Aircraft Aerial Delivery Branch, Air Mobility Division, OCRD.

Brig Gen Joseph R. Russ, slated for a second star, was executive to the Director of Army Research, then Brig Gen and now Lt Gen William J. Ely. Brig Gen Walter R. Kerwin was deputy director for Special Weapons and Brig Gen Frederick J. Clarke was chief of the Atomic Division. Brig Gen John H. Caughey served in the Plans Division.

Col Charles T. Horner, Jr., was in Plans and Programs. Col Roger M. Lilly was assistant to the Chief of Research and Development before that position was elevated to the equivalent of Deputy Chief of Staff level. Col George C. Fogle was chief of the Programs Branch, Programs and Budget Division, and Col Richard T. Knowles was assigned as OCRD member of the Standardization Group in the United Kingdom.

The nominees must be confirmed by the United States Senate.

Dr. Hillary J. Kelley, deputy to President Johnson's science adviser, is shown with Director of Army Research Brig Gen Walter E. Lotz, Jr., during a visit to U.S. Army Research Office headquarters Feb. 14 for a briefing by Col Andrew A. Aines, director of Army Technical Information.

President Nominates Ignatius for Under Secretary

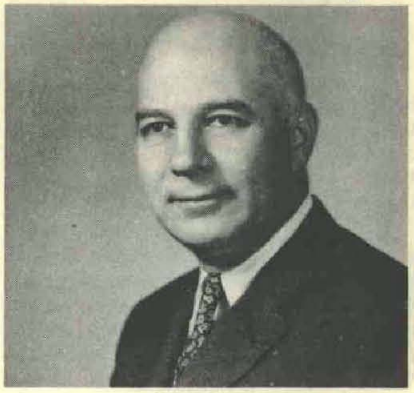
Presidential nomination of Paul R. Ignatius as Under Secretary of the Army was awaiting Senate confirmation at press time. Since May 1961, he has been Assistant Secretary of the Army Installations and Logistics.

Graduated from Harvard University in 1947 with a master's degree in business administration, Mr. Ignatius has earned the esteem of top governmental leaders as one of the ablest management experts in the Department of Defense.

Born in Los Angeles, Calif., in 1920, he received an A.B. degree with honors from the University of California in 1942 and was elected to Phi Beta Kappa. At Harvard he served as a research assistant and instructor for three years after graduation.

With two of his Harvard Business School associates, he formed Harbridge House, Inc., a management consulting and research firm in 1950. The firm prospered and Mr. Ignatius became increasingly well known in the Department of Defense as an authority on military supply and procurement.

Among the major projects he undertook as a consultant were the planning and establishment of the Army Management School at Fort Belvoir, Va., and the Army Logistics Management Center at Fort Lee, Va.



Paul R. Ignatius
Under Secretary of Army

During World War II, he served as a lieutenant in the Navy, principally as an aviation ordnance officer aboard the carrier *Manila Bay* in the Pacific Theater of Operations. For a short time, he was a member of a staff responsible for preparing a Navy Bureau of Supplies & Accounts Manual.

DDRE Seeks Integrated Effort in New Plans Office

Director of Defense Research and Engineering Harold Brown established the DDRE Plans and Policy Office, effective Feb. 1, to achieve improved coordination and integration of effort among Defense agencies.

Dr. Brown named Brig Gen J. W. O'Neill, USAF, his special assistant and acting Assistant Director of the Plans and Policy Office, formed by termination of the Director's Staff Group and Office of the Assistant Director for Planning, ODDRE.

Personnel from these units are being incorporated along with the Office of the Executive Secretary, Defense Science Board, into the Plans and Policy Office, as directed by Dr. Brown in a Jan. 28 memorandum.

Some of the functions of the Office of Assistant to Director, DDRE, which was terminated Feb. 1, also are being assumed.

The Plans and Policy Office will have responsibilities for: R&D policy and program guidance, coordination, planning and documentation; liaison with Joint Chiefs of Staff on R&D planning and policy; advance planning briefings of industry; public announcement of R&D policy and forecasts;

Coordination of ODDRE participation in activities of the Federal Council for Science and Technology; analysis and review of requirements definition process; monitorship of Defense Science Board meetings and activities; clearinghouse for information on Defense Department R&D resources;

Coordination of Bell Report activities; Automatic Data Processing policy in R&D field; special studies where necessary; Civil Defense matters; and coordination with the Research and Engineering Policy Council.

Personnel assigned to the Plans and Policy Office include: Dr. A. D. Suttle, Jr., staff assistant and special assistant to DDRE; Dr. W. W. Hammerschmidt, staff assistant and executive secretary, DSB (he will continue to report to DDRE in handling DSB functions); Charles S. Weaver, and Peter K. Ogloblin, staff assistants; Col R. A. Duffy, USAF, (guidance matters only), Comdr R. C. Duncan, USN, and Maj John Delistraty, USA, military assistants.

Army Research Council Briefed on Research Planning Process

By Dr. T. W. Adams

Dr. T. W. Adams

The Army Research Council (TARC) was briefed Feb. 14 on the research planning process. TARC is a 9-member study and advisory group appointed in January by Assistant Secretary of the Army (R&D) Willis M. Hawkins to consider research planning and Army in-house laboratory problems.

Dr. T.W. Adams of the Research Plans Office, U.S. Army Research Office, presented the briefing, and this article was prepared to cover much of the same subject material. The September 1963 issue of this publication carried an article by Dr. Adams titled "Creativity Conflict: Management versus Scientists," which discussed the degree of control of scientific personnel most conducive to discovery of new knowledge.

Dr. Adams prepared his political science master's thesis and his doctoral dissertation on the subject of Cyprus, based on residence and travel in the Eastern Mediterranean area between 1955 and 1957. He joined the Army Research Office professional staff in 1962 as a research planner.

As a result of the uprising that developed on the island, Dr. Adams was detailed early in February as chairman of a 4-member study group assigned to prepare a new handbook on the Republic of Cyprus. The task is assigned to the Foreign Area Studies Division of the Special Operations Research Office, American University, under an Army contract.

The term technological forecast may be defined as an estimate of the opportunities which *can be* expected in science and technology at some future time provided adequate levels of effort in research are maintained.

A research plan is a guide to the selection of those scientific areas, based on the technological forecast and potential payoff to Army operational needs, which *should be* supported over a future time period. A research program is an actual allocation of resources in those scientific areas which *will be* supported in a subsequent 5-year time frame.

Technological forecasts suggest many across-the-board technological and operational *possibilities*, the research plan provides *guidance* for selection of research objectives from the forecasts and future military objectives, and the research program *implements* the plan.

In September 1960, long-range operational and technical planners representing 12 major staff activities agreed on the necessity of inaugurating an Army technological forecast program. The consensus was that technological forecasts are preliminary to realistic long-range planning.

This is particularly true if these plans are to describe future operational requirements in the light of future attainable technology. In other words, technological forecasts are those necessary prerequisites which allow operational planners to be bold and imaginative without losing contact with technological feasibility.

During January 1961, the Army Research Office initiated a technological forecasting program. The first Army Technological Forecast consisted of eight volumes, one prepared by each Technical Service in its area of interest, and one on Army-wide research topics prepared by the Army Research Office. The forecasts were distributed and were well-received throughout the Army R&D, combat development, and operational planning structure.

A second edition of the Technological Forecast was published in 1962 in those areas in which there were sufficient changes to justify revision. After the reorganization of the Army in 1962, the third edition of the Technological Forecast was published in 1963 by the Office of the Chief of Research and Development, with Army Materiel Command providing the bulk of the scientific input.

Other than format, the Army reorganization caused no great change in the production of the forecasts, since Army working scientists still contributed as they had in the past. In addition, a new program of producing nonperiodic scientific and technical applications forecasts (STAF) on special topics was started under the aegis of the Advanced Technology Group of the Army Research Office. STAFs on lasers and electromyography have already been produced under contract and others are planned or in process.

Though research planning is based upon technological forecasting, the two functions are nevertheless quite distinct. The first objective of forecasting is to determine something of the nature of scientific advances, anticipate the timing of the advances, and thus allow identification of barriers which must be overcome if the application is to follow quickly.

Accurately anticipating the nature and timing of scientific advances is admittedly difficult and uncertain. However, the new tools, devices, techniques and skills provided by science and technology also give us some of the very means for projecting order and relationships, increasing analytical capability, and improving predictability in forecasting.

Even though planners may not know precisely what scientific advances will occur at what time, they must be prepared to exploit new knowledge when advances occur. For example, we know that advances in amplifying devices will have potential application in communications, surveillance, detection, fire control, information processing and so forth.

Many scientific advances will not be anticipated and this brings us to the second objective of technological forecasting—early recognition when they occur and immediate analysis of the significance of these advances in terms of their possible application to future Army needs.

Rapid recognition permits quick initiation of research to expand knowledge, thus permitting earlier application. Areas where there will be technological shortcomings must be recognized. Here research must be planned so as to develop that scientific area or some alternative to the point of feasibility for fulfilling future military operational requirements.

Anticipation of scientific advances, and recognition of barriers preventing application, permits comprehensive research planning. If the time between anticipation and application in science can be shortened, the Army benefits by shorter lead time, increased combat effectiveness, and decreased need for initiating costly supporting research after development programs have been started.

Long-range research planning therefore takes the product of Technological Forecasts—new ideas—and provides the guidance for deciding what to do about them with a research plan. This activity, now instituted in the Army Research Office, has begun to formulate techniques which will set

broad long-range objectives, fit research into overall R&D long-range planning, and thus insure a responsive and creative research program for the Army.

With this backdrop, we may now move to a description of how the draft Army Research Plan was actually prepared. The recurrent and as yet unresolved question of what is the most effective methodology to be used in planning for research was undertaken in a 2-month problem-solving experiment at the Army Research Office last spring. This experiment produced six significant observations about research planning, specifically:

- There is no one generally accepted research planning methodology with a proven record of success in multi-functional areas.
- There is no known systematic treatment of the problem which replaces intuition, considered judgment and scientific experience.
- The interdisciplinary aspects of research efforts must receive greater emphasis.
- Information flow must be maintained within the R&D community.
- An Army research plan should provide guidance to developing agencies to formulate a research program of optimum scope and depth. Moreover, the plan must be in a format which will also provide staff elements the visibility of potential payoff areas and applications of research results.
- Finally, the research plan must be grounded in the professional obligation to contribute to the scientific community, while simultaneously being responsive to stated requirements and missions of the Army.

Based on those considerations, the Army Research Plan was drafted. The Director of Army Research issued guidance to scientific divisions of OCRD on July 3, 1963, stressing four main points on how to prepare their respective portions of the plan:

- Research objectives will be grouped and presented using the 1963 Long-Range Technological Forecast subject format.
- Only ARO-monitored areas need be covered.
- Research and Exploratory Development Objectives (REDO's) grouped under a common subject title need not be individually distinguished by subcategory.
- The introductory paragraphs for each division section and individual topic are still essential despite the fact that they may partially duplicate the descriptive material in the Technological Forecast.

Each of the divisions—Physical, Life, Environmental, Human Factors and Operations Research—then prepared REDO's according to scientific disciplines or technical areas. Each division determined what scientific areas were adequate to present its research objectives.

The term, research and exploratory objective, was deemed preferable to the proposed use of "technical objective," because the former fits more properly the nature of the plan, avoids engineering overtones, and minimizes comparison and confusion insofar as the more specific hardware objectives of the developing agencies are concerned.

In setting up the REDO's, it was considered necessary to link the proposed research, at least in general terms, with the future threat, national goals, and stated Army operational needs. For this reason, operational and strategic plans, particularly the Basic Army Strategic Estimate (BASE), the Army Requirements Development Plan 1975 (ARDP–75), and the Combat Development Objectives Guide (CDOG), provided the principal operational goals for research planning.

ARDP–75, now superseded by the Army Strategic Plan (ASP), contained the priority operational requirements (POR's) of the Army, which, in the judgment of the Army staff, are the most urgent requirements for R&D. The CDOG lists, with priorities Qualitative Materiel Development Objectives (QMDO's), Qualitative Materiel Requirements (QMR's), and certain broadly stated operational and organizational objectives.

Bridging these operational requirements with science is the Army Long-Range R&D Plan, which determines research and development objectives from the operational requirements. The ARP directly supports these R&D objectives. In essence, high-level objectives are determined by the operational planners and the Army Research Plan ultimately translates these operational objectives into research and exploratory development objectives, which in turn serves as guidance to the developing agencies. The ARP thus points the direction, in the broadest sense, of where the Army should be going in research.

The scientific sections of the ARP

(Continued on page 15)

TARC Considering In-House Laboratory Problems

The Army Research Council (TARC), established by ASA (R&D) Willis M. Hawkins early in January, has been meeting daily at Army Research Office (ARO) headquarters in Arlington, Va. Organized to deal with Army in-house laboratories' problems relating to long-range planning, programs and policy, the 9-member Council includes (l. to r., front) Dr. J. V. R. Kaufman, chief scientist, U.S. Army Munitions Command; Dr. S. B. Levin, deputy director, U.S. Army Electronics R&D Laboratories (USAELRDL), Institute for Exploratory Research; Dr. Ralph G. H. Siu, scientific director, Army Materiel Command Research Division; Col Tyron Huber, chief, ARO Life Sciences Division. (Rear) Dr. C. W. Lampson, technical director, Army Ballistics Research Laboratories; Dr. Gilford Quarles, scientific adviser, Office of the Chief of Engineers; Col William D. Tigertt, director, Walter Reed Army Institute of Research; Dr. Leonard S. Wilson, chief, ARO Environmental Sciences Division; and Dr. D. M. Swingle, senior scientist, USAELRDL Meteorological Div.

Selected Reserve R&D Units Invited to Work on STAF Tasks

U.S. Army Reserve R&D Units and contract assistance will be used by the Army Research Office for specific long-range scientific and technological forecasts (STAF) such as space science capability, electromyography, and development of advanced excavation techniques.

A letter was sent out recently by the ARO Advanced Technology Group to selected Army Reserve R&D Units, asking their cooperation and participation in the preparation of a STAF on the Army's role in space during the next 20 years.

Units were asked to outline briefly their technical personnel capability in such technological forecasting. The letter said that "knowledge of the location of this unique talent is of definite value to the Office of the Chief of Research and Development," and that more information on the project will be furnished to units interested in participating. Only a small portion of the units queried had replied as this publication went to press.

"It is believed that sufficient competence exists within the R&D Reserve Units and that constructive contributions can be made to Army technological forecasts by the units," the letter stated. "It is not necessary for one Reservist to be responsible for the preparation of a forecast. It may be more desirable that several work in its preparation."

The forecast will serve as a background document to assist the operational planner in the development of materiel requirements and future tactical and strategic planning.

Because a tech forecast is directed toward the operational planner, its content minimizes technical details and emphasizes operational capabilities. To assume a high probability level, the forecast must be well supported by predictable advances in science and technology.

Scientific and technical background is developed from the knowledge of the individual preparing the forecast, an extensive search of the literature, and information of current research efforts. Background information is carefully reviewed and evaluated to provide a departure for, and to support a prediction of, the future technological environment.

The letter stated that the missions of the Army during the period of 1975-1985 will be affected by future space science capabilities. Specific tech forecasts are desirable in the areas of observation and surveillance, communications, navigation aids, bombardment systems, anti-satellites, and lunar operations.

Each of these subjects is to be covered in a separate forecast, and the approach should consider the standpoint of space support systems for earth combat. Further detail should deal with three levels of war—cold, limited and general.

Scientific and Technical Applications Forecasts represent a supplement to the U.S. Army Long Range Technological Forecast.

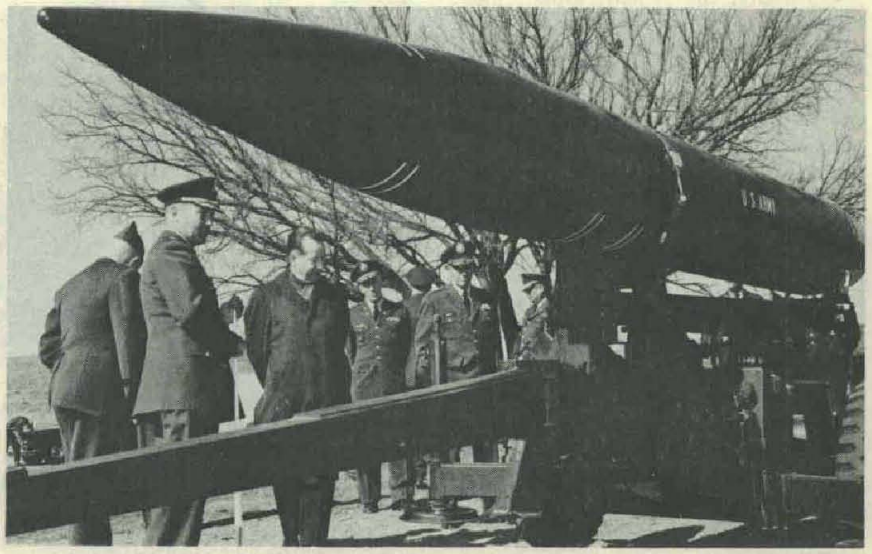
Under an Army Research Office contract, scientists at Georgia Tech University are preparing a technological forecast on electromyography (the process of registering or recording electrical activity associated with muscle action). The actual recording of such data is called an electromyogram.

With emphasis on muscle strength potentials and muscle tension measurement, the study is designed to provide an insight into the field of electromyography. The purpose is to gauge information content of myoelectric signals and their possible applications to the control of external apparatus—prosthetic devices, for example—to the modification of an individual's normal behavior by neuromuscular conditioning.

A preliminary report states that people differ greatly in the extent to which their muscles develop tenseness (as evidenced by electromyography) during the performance of mental tasks, and in the way they relax from this tenseness after ending the work.

Some people are continually tense. Some tense while performing the mental work but relax soon afterward. Some exhibit little or no muscular tension even during prolonged concentrations of effort. Researchers consider it plausible that such differences might show a correlation with differences in aptitude for mental work, particularly with ability to perform work under strain.

The report goes on to note the widespread interest today in measurement of various psychophysiological correlates for purposes of studying personality traits. In a sense, the ultimate objective of personality investigation is to characterize the central nervous system in such a way that the behavior of individuals under various circumstances can be predicated more reliably for Army duty.



DEVELOPMENTAL PROGRESS on Lance Missile system was reviewed by Assistant Secretary of the Army (R&D) Willis M. Hawkins during briefing at the Army Artillery and Missile Center at Fort Sill, Okla. Mr. Hawkins (center) is flanked by Maj Gen L. S. Griffing (right rear), Fort Sill CG, and Maj Gen Robert J. Lunn, chief of the Lance Project at Fort Sill's U.S. Army Artillery Board. Accompanied by Brig Gen Walter B. Richardson, director of Materiel Requirements, Office, Assistant Chief of Staff for Force Development, Mr. Hawkins also looked over Sergeant and Pershing missile systems.

Researchers believe that, by listening to electromyograph signals over a loudspeaker system, it should be possible to train a person to use selected muscles while relaxing others; also, to employ certain muscles not ordinarily associated with a given function to perform that function in the absence of or paralysis of the normal muscle.

For example, through electromyography, an amputee might be taught to operate an artificial hand by flexing the calf muscle or a muscle in the chest. One of the Army's responsibilities is that of helping amputees rehabilitate to a normal way of life.

The technological forecast study also is exploring the possibility of retraining muscles which have lost their usefulness. Laboratory experiments have indicated that patients may be able to regain as much as 20 percent usefulness of paralyzed muscles.

Electromyography can measure the potential of muscles so that a person may increase his effectiveness and endurance by relaxing all unnecessary muscles and applying only those needed to the full limit of their potential. The Russians have already adapted this principle effectively in training athletes.

Greater knowledge of existing studies and further research in this field are considered of great potential value to the U.S. Army for applications to military personnel. For example, knowledge of how combat troops can be trained to make better use of some muscles while relaxing others, so that their hiking and load carrying capability or general combat effectiveness would increase without early exhaustion, would be of importance.

A third STAF sponsored by the Army Research Office will explore development of underground excavation techniques and advances, useful to the Army during the next 20 years.

The forecast will be concerned only with underground methods and will not emphasize oil well drilling and surface excavation techniques. Of value to the Army would be machines capable of drilling rapidly large holes in any type of rock to make possible, for example, overnight installation of troop quarters and stores underground. It is hoped this capability, now beyond the state-of-the-art, some day may be achieved.

Machines have been developed which can drive tunnels up to 26 feet in diameter through soft rock but none are capable of penetrating hard rock at great speeds.

Recent mine disasters in Pennsylvania and Germany dramatically prove that present technology may be adaptable to permit large-hole drilling rapidly enough to rescue trapped miners before some or all perish, and therefore represents an area of research worthy of greater effort.

One of the major portions of the forecast and subsequent research will be in rock physics—what causes rock to bond and conversely what makes it fragment? The Bureau of Mines has conducted research in this area and industry has long realized the need for advances in rock physics.

One of the major obstacles to significant advancement in industrial excavation research in the last 50 years has been the high developmental cost and limited versatility of such machinery.

Mining companies, for example, do not want to destroy or recklessly fragment the rock in which they are operating. For their purposes, they have found that no machinery beats the careful speed of the miner for extracting the highest yield of mineral product. The purpose of the STAF project will be to recognize this state-of-the-art and identify possible methods of improving excavation techniques.

The forecast is expected to explore various possibilities of fragmenting rock, including ultrasonic drilling, electric arc or shock techniques, thermo or flame drilling, which vaporizes rock and which is now being used to some extent, chemical softening of rock, and even the use of Laser power.

The three specific forecasts discussed in this article are the beginning of many needed to predict what advances are coming and, using that knowledge, to direct Army research more accurately to take optimum advantage of the potentiality of future technology.

Miniature 2-Way Radio Passes Developmental Tests

Developmental tests completed recently have proved a new miniature radio is more suitable for operations in jungle environments than sets previously used, the U.S. Army Limited War Laboratory has announced.

Col S. C. Holmes, LWL commander, said the most recent tests were conducted at the Special Warfare Center at Fort Bragg, N.C. Troops of the 25th Infantry Division made tests of the set last fall during tactical operations in Exercise Bushwhacker on Oahu Island, Hawaii. Long-range tests also were made between training areas in the Hawaiian islands.

The sending-receiving radio, designated AN/PRC–64, withstood severe tactical movement in the jungle under realistic patrol conditions. It is designed to make the load of the combat soldier less of a burden and to enable dismounted and airborne troops to operate more easily in rugged terrain conditions.

The Limited War Laboratory, the Army's quick-response agency for meeting urgent materiel needs, particularly those of Special Warfare, developed the AN/PRC–64 because no existing lightweight radio could meet exacting communication needs of long-range jungle foot patrols.

The new set has special features which take advantage of miniaturization techniques developed at the U.S. Army Electronics Research and Development Laboratories, Fort Monmouth, N.J.

Complete with internal battery, carrying bag, antenna and all operating accessories, the set weighs less than 10 pounds, is waterproof and can operate on voice or hand-keyed code long periods without maintenance. Due to the low transistor power drain, the battery pack has many times the life of others now in use with field radio sets.

The AN/PRC-64 is the first U.S. radio set to incorporate the "whisper facility." By pressing a switch the operator can whisper softly into his microphone, transmitting his voice at normal level to the listener. This avoids revealing the patrol's position to a nearby enemy.

SPECIAL FORCES radio operators test AN/PRC–64 radio developed by U.S. Army Limited War Laboratory.

OCRD Director of Plans, Programs Briefs DIAC on Procedures

Brig Gen Raymond B. Marlin briefed a working group of the Defense Industry Advisory Council Feb. 10 on how Army operational requirements are defined and translated into research and development activities.

As director of Plans and Programs, Office of the Chief of Research and Development, he addressed a group headed by Deputy Director of Defense Research and Engineering Dr. Eugene G. Fubini. The group included representatives of several of the Nation's major industrial concerns.

General Marlin's talk centered on three broad topics defined as:

- The evolution of Army materiel requirements, emphasizing the derivation of these requirements and their interplay with joint Defense agency and Army plans.
- The translation of requirements from these plans and from combat developments activities into research and development effort.
- The Army research and development cycle, pointing up key management techniques and procedures used to control R&D effort.

Three important influences on research and development discussed by General Marlin included the impact of Army reorganization in 1962. Creation of the Army Materiel Command and the Combat Developments Command, he said, has resulted in significant successes in improving the R&D procedures. Cross-feeding of information between these commands was credited with producing "mutual benefit to their respective missions."

The second influence cited by General Marlin "is the necessary continual interplay between requirements definition and fulfillment and the essential scientific and technological base. Real advances in weapons systems will not result without this interplay."

Third among the influences he recognized "is the inherent complexity of the Army's problem in defining requirements based on its broad and varied mission. While concerned with all elements of the spectrum of conflict, the Army's major role in providing general purpose forces poses an infinite variety of potential weapons requirements.

"This demands that requirements planning must do more than provide weapons patterned after but better than those used in the past."

Since the Nation's military strength is designed to provide suitable responses to a threat, its nature and magnitude, he continued, the Joint Strategic Objectives and Army plans develop the rationale for military requirements. Analysis of the threat in relation to the wide variety of alternatives available to the United States results in the strategic appraisal.

The planning documents from which the research and development effort of the Military Services derives its broad guidance are the Joint Long-Range Strategic Study and the Joint Strategic Objectives Plan, he said, adding:

"The Joint Long-Range Strategic Study contains a forecast of the nature of possible international conflict some 8 to 12 years in the future. In so doing, it assays the present and anticipated weapons and techniques upon which a strategic concept must be based. It also surveys in some detail the Western scientific and technological advances expected within the time frame of the study.

"The basis for this survey is contained in the technological forecasts developed by the Services. These forecasts do not state R&D requirements but cover anticipated technological capabilities, assuming full exploitation of these capabilities without regard to resource constraints. It must be recognized that these forecasts and others are not the total answer—that they must not inhibit additional advances in science and technology as they become known.

"Certain of the basic undertakings contained in the Joint Long-Range Strategic Study prescribe forward looking research of potential military value to guide R&D long-range effort.

"The Joint Strategic Objectives Plan—a mid-range plan projected from 5 to 8 years into the future—contains a detailed research and development annex, which outlines the major objectives on which priority R&D effort and resources should be expended. It identifies critical problem areas which require investigation and, in this light, the Joint Standard Operating Procedure also provides guidance to Army R&D."

Turning again to Army R&D, General Marlin explained that the current family of three plans, restructured during the past year, provides a basis for the development of strategy, forces and materiel. These plans derive guidance from joint plans and, in turn, provide data, information and concepts to serve as the Army input to succeeding generations of joint plans.

The three major documents of Army planning, he said, are the Basic Army Strategic Estimate (BASE), the Army Strategic Plan (ASP), and the Army Force Development Plan (AFDP).

The BASE is essentially a long-range estimate of the situation which culminates in the statement of a broad strategic concept as it affects the land battle. It contains a forecast of significant scientific and technological advances considered feasible within the time frame concerned, covering both anticipated U.S. capabilities and significant foreign capabilities.

The U.S. forecast is a primary source for the more specific R&D guidance contained in the Army Strategic Plan, which reflects the strategic concepts contained in the BASE.

The Army Force Development Plan,

Brig Gen R. B. Marlin

Brig Gen Raymond B. Marlin has been director of Plans and Programs, Office of the Chief of Research and Development, since July 1963. Before his present assignment, he was chief of staff, Army Infantry Center, Fort Benning, Ga., for two years.

From June 1960 to May 1961, he was deputy comptroller, Comptroller Division, U.S. Army, Europe, and before that deputy brigade commander, Third Infantry Division, USAREUR, from December 1958 to May 1960.

Graduated from the U.S. Military Academy in 1939, he served during World War II with the 23rd Infantry as a battalion commander, was wounded and returned to Washington in 1944. His decorations include the Distinguished Service Cross, Silver Star, Legion of Merit, Bronze Star with Oak Leaf Cluster, Purple Heart and Army Commendation Medal.

Other assignments since World War II have included deputy chief of staff, Iceland Defense Board (1951-52) and chief of Plans and Coordination Office, Budget Division, Comptroller of the Army (1953-55). He graduated from the Army War College in June 1956.

among other things, insures that the materiel which results from the Research, Development, Testing and Evaluation (RDT&E) Program is integrated into existing forces in a manner to best utilize available and on-coming resources.

"This plan addresses one of the more difficult service problems," he said, "which is the resource impact of the introduction of new weapons systems in the future. How do we phase in (and can we afford) such systems in terms of forces, money, facilities, and personnel? What are the training, procurement and other implications of the introduction of a new main battle tank, a new missile, Nike X, AADS–70 or even Redeye?"

The Force Development Plan also points up anticipated decision dates for the introduction of new systems into the R&D cycle in the longer-range period.

General Marlin said that the Army Research and Development Long-Range Plan (ARDLRP), a second generation of which is now under preparation in OCRD, establishes broad policy for reaching the objectives set forth in the other plans. It integrates operational requirements with projected advances in science and technology and analyzes the long-range period for new starts.

The ARDLRP has a 4-fold purpose: 1) establish broad R&D policies; 2) provide guidance for scheduling R&D; 3) reflect status of current and projected equipment; 4) analyze the Army R&D effort.

The plan, it was explained, establishes some 50 R&D objectives which expand the priority operational requirements contained in the Army Strategic Plan. These form the basis for detailed technical objectives in other implementing documents, such as the Army Research Plan (ARP) which provides detailed guidance to the Army Research Program.

Plans such as the ARDLRP and its companion ARP exploit science and technology and provide feedback into the family of major Army plans. This feedback, it was stated, is part of the continuous interchange of influence between the technological base and the strategic and operational concepts in the plans.

"Thus," General Marlin said, "it is possible to begin with a broad objective stated in joint plans, trace it in a direct line through the priority operational requirements in Army plans, then through the R&D objectives and materiel requirements in the Army R&D Long-Range Plan, and ultimately into a program project."

The speaker said that he particularly wanted to point out the invaluable input to planning and to operations made by industry and its laboratories and by the in-house scientific personnel and facilities of the Army, "representing the scientific and technological base so essential to truly forward-moving research and development efforts."

The Army Scientific Advisory Panel was cited as "an invaluable contributor on matters of scientific and technical input." Presently consisting of 21 men pre-eminent in their fields, the ASAP operates on an Ad Hoc Group basis to review and advise the Secretary of the Army and top R&D leaders on RDT&E subjects. An additional body of scientists, engineers, educators and industrialists assists the Panel as required—on a consultant basis.

Responsibilities of the Army Materiel Command and the Combat Developments Command for program planning and operational in-put then were explained. From an overall point of view, the mission of the Combat Developments Command is to answer: How should the Army be organized? How should the Army be equipped? How should the Army fight?

Materiel requirements developed from studies on these questions by in-house laboratory and contract agencies are stated in the form of Qualitative Materiel Development Objectives (QMDO), Qualitative Materiel Requirements (QMR) and Small Development Requirements (SDR).

The QMDO states a military need for the development of new materiel. Feasibility of such a development, in this case, is considered to be unknown or in question. The QMR states a military need for a new item, system or assemblage whose development is believed feasible. The SDR covers minor projects of proven feasibility. They can be provided in a relatively short time, are not complex and are of low cost.

Consideration is being given to introducing a new middle-stage requirements document, tentatively called the Qualitative Advanced Development Requirement (QADR). This would be more definitive than the QMDO but less detailed and definitive than the QMR.

The QMDO, QMR or SDR normally is drafted in the development agency and forwarded to CDC headquarters at Fort Belvoir, Va. There it is reviewed, modified as necessary, and coordinated with the Army Materiel Command and the Continental Army Command. Drafts are sent to interested elements of other military services.

The proposed requirements document then must be approved by Headquarters, Department of the Army. It may call for a total feasibility study, including costs, personnel, technical capability, and nature of the threat to be combatted. After a review of the study, the QMR, if approved, is sent to the appropriate developing agency for initiation of responsive research and development.

Since a QMDO covers a requirement not believed feasible, it may serve to emphasize research or exploratory development in a particular area.

The Department of Defense requires that a technical development plan be submitted for each project in the advanced, engineering, and operational systems development categories to outline its scope, magnitude and future direction. Included is a description of the item, performance characteristics, a schedule of the milestones in the development cycle, test plans, construction requirements, and a detailed funding plan.

A compendium of the activities of the combat development system is a document called the Combat Development Objectives Guide (CDOG) which contains approved organization and operational objectives, a summary of the studies program, a summary of field tests and experiments, and a section devoted to materiel requirements.

As a ready reference for those directly engaged in combat development as well as in R&D work, the CDOG is widely used in the Army and is also furnished to elements of the Department of Defense, the Navy, the Air Force and the Marines.

The Research and Development Program and Budget Cycle contains the mechanisms which link the concepts, objectives and requirements to the specifics of resource commitment in the budget.

As approved, this program constitutes the R&D portion of the Department of the Army 5-year force structure and financial program. This shows the commitment of resources in support of RDT&E for the current fiscal year, plus planned commitments for five years in the future.

"It is important to note," General Marlin said, "that the detailed development of the program for a particular fiscal year starts some 18 to 20 months prior to the beginning of that fiscal year."

(Continued on page 32)

Federal Council for Science, Technology Approves Recommendations to Create Central Clearinghouse

The White House announced Feb. 28 action by the Federal Council for Science and Technology to make results of Federal-sponsored research and development more readily available to industry, universities, scientists and engineers.

Through an interagency agreement, unclassified technical reports and translations generated by all Government agencies, and not containing proprietary information, will be uniformly indexed and made accessible through a single agency.

Plans are being developed for this agency to provide current awareness information on who is doing what research, where, and with what Federal funds. Requests will also be met for explicit scientific and engineering information by referral to appropriate specialized information centers.

To implement this plan, the Department of Commerce will take immediate steps to strengthen its clearinghouse function authorized by Congress through Public Law 81-776, and now being performed by its Office of Technical Services.

Steps to provide a single point of contact for Government activities in the physical and engineering sciences will complement services now available through the National Library of Medicine and the National Agricultural Library.

The measures represent a major step toward strengthening and coordinating the various science information activities of the Federal establishment and will be of major importance in assisting American industry to benefit from defense and space research, the White House said.

The Federal Council for Science and Technology is a body of senior policy officials from eight Federal departments and agencies that serves with the Office of Science and Technology to assist the President in developing Government-wide plans and policies relating to scientific research and development.

Dr. Donald F. Hornig, Special Assistant to the President for Science and Technology is Council chairman.

Recommendations for this broadened clearinghouse function were developed by the Council's Committee on Scientific Information headed by Lt Gen William J. Ely as chairman.

The Council approved the clearinghouse plan at a meeting Feb. 11, at which action was taken to redesignate its Committee on Scientific Information. A charter was approved for expanded responsibilities as the Committee on Scientific and Technical Information (COSATI instead of COSI).

COSATI's new charter gives the body a primary objective of "development among the Executive agencies of a coordinated but decentralized STINFO system for scientists, engineers and other technical professions . . . and coordination and cooperation with improved Federal and National systems for handling scientific and technical information."

COSATI is charged with continuing action on problems related to improved handling of scientific and technical information within the existing framework of Government and non-Government efforts for the present, "until much more can be learned about needs, scope, and economic considerations."

First on the list of COSATI priorities is that of identifying the problems and requirements for improvement of STINFO processes, then to review the scope and adequacy of present programs, and to devise or review new programs and other measures to meet the requirements.

In addition, COSATI will recommend standards, methodology, and systems for uniform adoption by the Executive agencies, identify and recommend assignments of responsibility among the agencies to review and make recommendations concerning the resources assigned to the programs, and to propose management policies "to improve the quality and vigor of the information activities."

2 OCRD Civilians Get Meritorious Service Award

Chief of Research and Development Lt Gen William W. Dick, Jr., presented the Meritorious Civilian Service Award to Roy D. Greene and Raymond B. Murray, Jr., at a Feb. 7 ceremony in the Pentagon.

The Department of the Army's second highest civilian award was presented to Mr. Greene in recognition of his work as chief, Research and Programs Branch, Army Research Office. Mr. Murray is a program analyst in the Program and Budget Division, OCRD.

Director of Army Research Brig Gen Walter E. Lotz, Jr., assistant director Col Charles B. Hazeltine, Jr., and other key members of General Dick's staff attended the ceremony in his office.

Mr. Greene's citation commended him for distinguished service in positions of successively increased responsibility. It stated that "his superior accomplishments in developing and initiating new procedures, revising existing procedures for financial management, and organizing reporting and accounting procedures have improved responsiveness to requirements and caused major reductions in lead time."

Mr. Murray's citation stated that he had "distinguished himself in a position of great responsibility with required rapid response and accurate analytical, statistical and reporting ability . . . Through his continued superior service, demonstrated professional ability and diligent efforts which produced superior results, Mr. Murray has made significant contributions to the successful accomplishment of the Army research and development program."

In 1961 Mr. Greene came to the Army Research Office as a program analyst and he became chief of the Research Programs Office in February 1963. Previously, he served two years as a budget analyst in the Office of the Chief of Ordnance after participating in the Army Management Intern Program from July 1959 to December 1959. He received a B.S. degree from Western Kentucky State College in 1952.

Before joining the OCRD staff in January 1961, Mr. Murray was a budget analyst for 2½ years in the Office of the Director of the Army Budget, Office of the Comptroller. He holds A.B. and S.T.B. degrees from St. Mary's Seminary, Baltimore, Md.

Chief of R&D Lt Gen William W. Dick, Jr., presents Meritorious Civilian Service Award to Roy D. Greene, chief, ARO Research Programs Branch.

TARC Briefed on Research Planning Process

(Continued from Page 9)

were coordinated both informally and formally with working scientists within the Army's R&D community. That is to say, the scientists in the Army Research Office, while not directly engaged in research themselves, maintain professional contacts with bench-level scientists and are aware of the progress of their work.

Consequently, most of the research and exploratory development objectives in the ARP, as well as the potential payoffs and application of this research, reflect the professional judgment of both bench-level scientists and science administrators.

Although it is recognized that a scientist should have substantial autonomy to set his own goals in a laboratory, it has been found that scientific and engineering performance is enhanced when goals are influenced by guidance from the administrative echelon. Thus, somewhere between the extremes of total freedom and rigid administrative control lies the ideal environment for high productivity in the laboratory.

Researchers should not look upon administrative guidance as "the scheduling of breakthroughs," the "crank-handle production of inventions," or simply as unnecessary harassment. Rather, these scientists should consider such guidance as management's conscientious attempt to devise a practical art of systematic innovation, an art that takes account of more factors than researchers themselves consider. The reverse must also be permitted. Laboratory-level scientists must have an input to the administrative level in hopes of establishing a dynamic feedback loop.

It should be acknowledged that no organization, Government or private, can afford to sponsor a totally random course or unpredictable pattern in research and development. Nevertheless, administrators should remember that intelligent planning for research is not the planning of research results; that is, one can plan the investment of time, brain power, and facilities in presumably profitable research areas although outcomes may be uncertain. The need for this type of plan is obvious.

One final thought, the great hazard in any research planning activity, is that the plan will become an end in itself rather than a tool for guiding the programing of resources in the most effective way to achieve objectives. It is quite definitely our intent that tasks and projects will be included and supported in the Army research program even if they do not necessarily relate to the published plan. Some resources should be reserved for unforeseen opportunities. Novel projects which offer attractive alternatives for the achievement of objectives must be sought and, when found, supported. Research objectives must themselves be under constant review even though the plan itself is designed to be a lasting document.

We cannot be sure what pitfalls lie ahead of us. It is therefore necessary that we keep objectives in the forefront of our thinking and maintain the greatest possible flexibility for changing broad plans as new, significant information becomes available to use. By doing so, we will be able to increase the number of choices available to us in providing superior means for successful field army operations in combat, as well as in noncombat environments.

Latin America Expert Joins SORO on Sabbatical Leave

Dr. Rex D. Hopper, chairman of the Department of Sociology and Anthropology of Brooklyn College, recently joined the staff of the Special Operations Research Office, American University, as a senior staff scientist.

Dr. Hopper is serving during his sabbatical year as part of a SORO program of active interchange with the academic community. Recognized as an authority in the fields of violent social change or revolutions, he will pursue the development and testing of theoretical models of revolutions, extending his previous research, and participate in other SORO studies in the same field.

His geographical area of specialization, on which he has written extensively, is Latin America. He was a member of a 3-man team to study engineering programs in Latin American universities in 1961, and has spent many years there studying the rise and decline of military-backed governments.

Value Engineering of Cartridge Case Saves Millions

Value engineering progress in 1963 at the Army's Picatinny Arsenal, Dover, N.J., included a design change that will save taxpayers an estimated $4 million during 1964 on blank ammunition cartridge cases.

What's more, the change won a prize in a contest sponsored by a national publication devoted to value engineering, and the cash award was donated to benefit a home for the aged, the Boy Scouts, and other charities.

Edward Jescerzewski, Picatinny project engineer, shows models of economical aluminum cartridge case (developed at the R&D laboratories) to Maj Gen Floyd A. Hansen, CG, Army Munitions Command. Design change will save estimated $4 million.

Submitted by William Kauf, chief of Picatinny's Value Analysis Office, the report on the new cartridge case told of how the design change substitutes impact-extruded aluminum for brass and steel. The case is less expensive to produce, reduces weight, and is reported easier to ship.

A blank round of ammunition consists of a short cartridge case containing a primer, black powder charge and a sealer. The cases formerly were made by cutting down or reconditioning rejected or used cases, or sometimes manufacturing new ones, at a cost ranging from $2 to $4 each. The aluminum cases cost about 55 cents.

Project engineer for the new aluminum cases was Edward Jescerzewski of Picatinny's Process Engineering Laboratory, working with Frankford Arsenal in Philadelphia, Pa., and the Mueller Brass Co., Port Huron, Mich.

Col Henry H. Wishart, Picatinny Arsenal commander, and chairman of the Federal branch of Dover's 1963 Community Chest campaign, presented the check for the contest award to Maj Gen Floyd A. Hansen, CG of the Munitions Command, to be turned over to the charity fund.

Army Contracts Exceed $121 Million

A $25,740,861 contract to Ford Motor Co., awarded by the U.S. Army Mobility Command for 10,000 M151 ¼-ton utility trucks with spare parts and test items, tops the list of recent Army contracts totaling over $121 million.

International Business Machines Corp. received a $15,937,241 contract for purchase of formerly leased ADP equipment.

General Telephone and Electronics Corp. was awarded $12.4 million for continued work on the multi-function array radar (MAR) portion of the Nike X antimissile missile system, swelling its total under this contract to $49.2 million.

Douglas Aircraft Co.'s missile and space systems division received a $12,000,000 subcontract for continuation of research and development of the Nike Zeus missile as part of the U.S. Army's Nike X system. Bell Telephone Laboratories made the award.

Minneapolis Honeywell Regulator Co. received three contracts totaling $7,021,853, one for production of fuzes for the XM218 grenade, another for M219 grenade fuzes and a third for production of classified munitions.

Blount Construction Co., Montgomery, Ala., was awarded a $6,261,600 contract for construction of the Central Instrumentation Facility at Merritt Island, Fla. Robert E. McKee, general contractor, El Paso, Tex., will construct the Lunar Excursion Module Test Facilities for NASA at White Sands Missile Range, N. Mex. for $5,154,551.

Sperry Rand Corp. will modify an existing contract for ammunition for $5,824,005. Burroughs Corp. received a $5,000,000 contract for classified electronics equipment. Sylvania Electric Products, Inc. received two contracts totaling $3,445,000, one for research and development of tactical electronic warfare devices for use in Army aircraft and the other for modification of a mobile digital computer (MOBIDIC) in operation at Fort Huachuca, Ariz.

Raytheon Co. will design and develop a portion of the Hawk Anti-Tactical Ballistic Missile for $2,749,990. Pastushin Industries, Inc., Los Angeles, Calif., will produce dispensers and containers for use on the Selected Ammunitions Program for $2,540,550.

C. H. Leavell & Co. and Peter Kiewit & Sons, Inc. were awarded a $2,295,220 joint venture contract for site development and utilities for the Saturn Second Stage (S-II) test facilities by the U.S. Army Corps of Engineers at Mobile, Ala.

Intercontinental Manufacturing Co., Garland, Tex., received a $2,206,746 contract for production of first and second stage motor cases for the Pershing missile. Martin Marietta Corp. was awarded a $1,999,021 contract for production of modification kits for the Pershing missile system.

The Goodyear Tire and Rubber Co. received a $1,663,734 contract for production of shoe assemblies and rubber tracks for the M48 tank. W. V. Pangborn & Co., Inc., and Lowry Electric Co., Inc., will construct for $1,458,432 a frequency control and analysis missile instrumentation station at Merritt Island, Fla.

The Ralph M. Parsons Co., Los Angeles, Calif., was awarded a $1,308,866 contract for additional architect-engineer services to update changes in connection with the Nike X Weapons System. AVCO Corp. was awarded a $1,231,352 modification to a contract for research in re-entry physics and optical discrimination methods.

General Dynamics Corp. received a $1,205,000 modification to a contract for research and development on Redeye for FY 1964. Chrysler Corp. was granted $1,195,788 for maintenance of the Michigan Army Missile Plant, Sterling Township, Mich.

Western Electric Co. is to receive $1,170,751 for work in support of the Project Sleighride, a re-entry vehicle vulnerability test program. Flair-Northern Division of Atlantic Research Corp. was granted a $1,039,500 modification to a contract for aluminum shells and loading assemblies. Firestone Tire and Rubber Co. will produce 155 mm. projectiles for $1,102,150.

Engineering Students Given Briefing on Springfield Armory Design Activities

An insight into practical applications of engineering was given 45 senior engineering students from the University of Massachusetts when they visited the Army's Springfield Armory laboratories Feb. 14.

Staff members of the School of Engineering, Department of Mechanical Engineering at the University, joined the students on the field trip. The purpose was to incorporate a research type analytical situation common to the basic mission activity of the Armory into the class work of the students. The U.S. Army Weapons Command installation has worked with the University on this program several years.

Col William J. Durrenberger, Armory commander, welcomed the group at a science symposium developed by personnel of the Armory Research and Engineering Division. The theme was "Utilizing Basic Engineering Sciences in Weapon Design," which was discussed by Dr. Alexander Hammer, chief of the Support Research Branch.

James Falcone of the Mechanical Research Laboratory spoke on "Engineering Photo Analysis," Robert Ledoux discussed "Engineering Photo Analysis," and James O'Neill talked about "Spring Design."

Chinook Demonstrates 'Dump Truck' Capability

WHILE STILL MOVING FORWARD, a CH–47 Chinook helicopter dumped 8,500 pounds of "C" rations rigged to four pallets from a rear ramp in service tests conducted recently by the U.S. Army Test and Evaluation Command's Airborne, Electronics and Special Warfare Board, Fort Bragg, N.C. Cargo weight is believed heaviest ever delivered by Army helicopter without use of parachutes or external devices. Airborne Service Test Division personnel devised "dump truck method" under the leadership of Col Robert M. Piper.

Army Mobile Floating Assault Bridge-Ferry Undergoes Fort Knox Field Tests

One of the U.S. Army solutions to problems of surmounting inland waterway obstacles in assault operations, the self-propelled fully amphibious floating bridge-ferry, is being field tested at Fort Knox, Ky.

Designed by the U.S. Army Engineer Research and Development Laboratories at Fort Belvoir, Va., the units were given preliminary tests there recently following delivery from Chrysler Corp., where they were built.

Self-propelled interior and ramp units that comprise half of a mobile floating assault bridge-ferry travel overland at speeds up to 35 miles an hour.

Capable of supporting loads up to 60 tons in water and of traveling up to 8 m.p.h. with that weight, the transporter vehicle is powered by a 335-horsepower diesel engine and has an overland speed rating of 35 m.p.h.

Constructed of riveted aluminum and weighing 16 tons, the transporter vehicle enters the water without preparation and becomes a boat 39 feet long and 12 feet wide. Each vehicle can carry an end bay superstructure 37 feet long and weighing 10 tons or an interior bay 27 feet long weighing 7 tons.

Each ferry-bridge consists of two end bay units and the number of interior bay units required for a specific operation. During travel the superstructures are carried lengthwise and folded. Upon entry into the water they are rotated hydraulically 90 degrees, unfolded and connected.

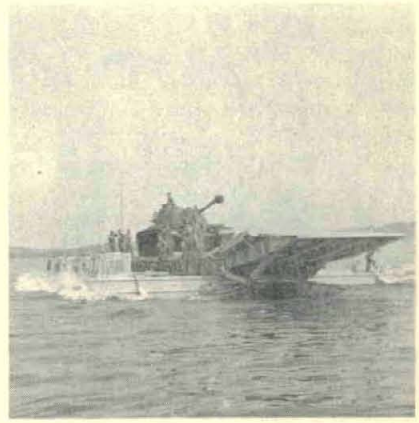
The wheels used for land travel retract hydraulically upward into wheel wells when the vehicle enters the water. The wells are supplied with compressed air to prevent loss of air during the displacement process.

The same engine used for land travel powers a 28-inch diameter ducted propeller for movement in water. The propeller can be steered 360 degrees, may be lowered 16 inches below the bottom of the boat, and rotates out of position for road travel.

In comparison with the initial tests at Fort Belvoir, as reported in the November 1963 issue of this publication, the recent tests have greatly reduced assembly time of the bridge-ferry. Three-man crews of four vehicles can now assemble a 4-unit ferry in 6 minutes (initial time was 15 minutes) and a 400-foot bridge can be formed in 20 minutes by crews of 16 units.

Members of Surface Mobility Section of Mobility Advisory Group, established recently by Maj Gen Alden K. Sibley, CG, U.S. Army Mobility Command, halt for a moment during recent 3-day visit to MOCOM Engineer R&D Labs at Fort Belvoir, Va. L. to R. are James C. Zeder, vice president (Ret.), Chrysler Corp.; Dr. Ralph E. Fadum, Dean, School of Engineering, N.C. State; K. T. Keller, chairman of the board (Ret.), Chrysler Corp.; Col J. M. Kerkering, CO, USAERDL; Eugene L. Vidal, aviation official and Advisory Group chairman; Maj Gen L. J. Sverdrup, USAR (Ret.), president of Sverdrup & Pardel & Associates, Inc., and chairman of Surface Mobility Section; Maj Gen Sibley; Dr. I. R. Ehrlich of Stevens Institute, special consultant to General Sibley; Dr. Lester Goldsmith, vice president (Ret.), Atlantic Refining Co., and Irving Appleblatt, acting R&D director, MOCOM. James Fitzgerald, Jr., commissioner of Public Works in Massachusetts (not shown) is a group member.

Crew of bridge unit at right rotates the deck into connecting position while other units enter the water.



MOBILE FLOATING ASSAULT FERRY, designed by USAERDL, hauls a 47-ton tank across the Potomac River at 8½ miles an hour.

Army Biomechanical Research Lab Initiates 'CPL' in Burn Patient Care

CPL is fast becoming a synonym for TLC (tender, loving care) in bridging understanding between research technicians and burn patients at Walter Reed Army Medical Center's Biomechanical Research Laboratory, Forest Glen, Md.

The new human touch was added to what was known until last year as the Army Prosthetics Research Laboratory when Capt Mary Yeakel joined the staff.

Fresh from three years duty with burn patients in the Surgical Research Unit at Brooke Army Medical Center at Fort Sam Houston, Tex., when she reported for duty last August, Capt Yeakel was quick to note a liaison gap between lab technicians and patients.

Brooke Army Medical Center is generally regarded as perhaps the finest burn research center in the world (see December 1960 issue, page 18, Brooke AMC Pioneers in Treating Burns). The "Closer Patient Liaison" link Capt Yeakel rapidly established at the Biomechanical Laboratory, as a result of her training at Brooke, has been winning respect of all persons concerned.

Director of the Laboratory, Lt Col Peter Margetis, is among those who are commendatory of the results of CPL as a means of helping burn patients recover more completely. In many instances, the objective is to end the use of biomechanical devices by patients.

"Seriously burned patients," Capt Yeakel stated in a recent interview, "offer a constant challenge to both doctors and therapists. The treatment of burns, especially bad ones, calls for a combination of things. Ingenuity and imagination in the development of devices for use with burn patients is usually helpful.

Capt Kilulu Von Prince and Pfc Robert L. Siko, a WRGH patient, demonstrate prototype of fiberglass splint developed at Brooke Army Medical Center by Capt Yeakel and associates.

OCCUPATIONAL THERAPIST Capt Mary Yeakel discusses one of her many projects with Lt Col Peter Margetis, director, U.S. Army Medical Biomechanical Research Laboratory.

"It is fascinating work," she said enthusiastically while exhibiting a crude mockup of a rigid handsplint for a burn patient. "Take this group of wires, for example. One of the many problems in grafting skin to a badly burned hand is to hold the fingers in an optimum position for healing and function while the new skin is being grafted. I have been toying with this idea for some time and, with the help of others around the lab, I think that we are going to come up with a workable model."

An artist's drawing in one of the labs showed that a composite for the handsplint was taking form. The splints for the fingers had been enlarged from the original flimsy wire, and surgical clips had been added to hold the burned fingers in place.

Capt Yeakel and an associate started experimenting with a fiberglass handsplint at Brooke AMC, where she was an occupational therapist. The idea was to find a material that would follow the natural contours of a hand or other limb. Once the fitting had been made, it would be impregnated with resin to become a firm, tough, lightweight device.

The samples tested at first were not satisfactory. After much searching, the proper material of chopped strand matt was found—in a boatyard where it was used for patching damaged fiberglass boats. The short, uniform fibers allowed proper molding in any desired shape.

After the splint was perfected in the lab, it was used in a number of successful experiments on patients and is now part of standard operational procedures for treatment of hand burns at Brooke.

An additional bonus in the use of this fiberglass splint may result from experiments now being conducted on two Walter Reed General Hospital patients, one a quadriplegic and the other a paraplegic. If the tests prove successful, it would be another example of multiple results from a single project of basic research.

Additional experiments are being carried out by Capt Yeakel and her colleagues to develop other types of splints, many of which some day may be used for purposes other than burns.

One of these is a plastic sack filled with a silicone substance mixed with a catalyst, a chemical that promotes varying degrees of hardness. The limb is placed on the silicone-filled sack and the soft rubber soon hardens into a tailored splint that follows the natural contours.

Because a splint used on a burn patient needs to be much softer than one used for a broken bone, further experimentation must determine the right amounts of catalyst needed to control rigidity of the silicone.

Research is also being expanded on another type of splint which incorporates many features of the silicone device, consisting of a molded plastic bag into which air is inserted.

"When we get the bugs worked out of these splints," Capt Yeakel explained, "we should come up with workable devices that will be useful for many types of injuries other than burns. In our work here, we often

Sabot mine-clearing boot was modified by Walter Reed Biomechanical Research team to conform to position of ankle bones and feet of the soldier.

find the solution to one problem while searching for an answer to another."

The continuing search is for new devices and materials that may be of value to occupational and physical therapists for adapting equipment and assistive devices to physically handicapped patients.

In a short-term research project on a boot designed for soldiers assigned to clearing mine fields, wearers complained that the ankle hinges on the leg braces were uncomfortable.

The Biomechanical research team made a simple change of the position of the hinges on the braces to conform with the ankle bones of the wearer and replaced the conventional strap buckle with a smooth-fitting closure. The modification was later incorporated in mass production of the boot.

Another of Capt Yeakel's projects is a proposed modification of the Stryker circular electric bed, which facilitates turning the patient so that alternate sides of the patient can be exposed to the air.

When one of the surgeons suggested that the patients could be turned fewer times if a net-like material were substituted for the sponge mattress in use, an immediate search was begun for a new material.

The change would allow air to flow freely around the patient, cutting down the number of times the patient has to be turned and relieving ward personnel to perform other duties.

Capt Yeakel holds net designed to replace sponge mattresses on Stryker beds. New material would allow air to flow freely and reduce number of times the patient must be turned.

"This all sounds very simple on the surface," said Capt Yeakel, "but we still have a long way to go. Several materials have already been selected and tested, but we are not satisfied with any of them at this point. When a material finally is found, I will need the help of the mechanical engineers to develop a suitable frame and the machinists to fabricate it."

Searching for answers to problems is a way of life for those who work in the Biomechanical Research Laboratory at Forest Glen. It was through trial, error, and ingenuity that the many marvels of prosthetics were devised.

Continued efforts of dedicated scientists and technicians, it is believed, will one day yield such wonders of science as a practical electric elbow, a prosthetic hip, and tracheas and aortas in lifelike plastic for open heart surgery.

The real beginning of the great strides in prosthetics research came in 1946 when another name change took place. It was at that time that the seven Army hand laboratories scattered around the United States were merged into a single installation at Forest Glen.

In reviewing the accomplishments of the new Army Prosthetics Research Laboratory, one prominent orthopedic surgeon was quoted as saying: "It has done more in prosthetics of the upper extremeties than has been done in the preceding 5,000 years."

Among developments of note are the basic mechanical hand and interchangeable voluntary closing hook, the lifelike cosmetic glove, artificial arteries, a unique plastic-laminated arm that allows the amputee to perspire in comfort, and many others.

More important, this new knowledge in the field of prosthetic devices is being shared with civilian manufacturers so that thousands of amputees may lead happier, more useful lives.

NAS President Heads Defense Science Board

New chairman of the Defense Science Board is Dr. Frederick Seitz, president of the National Academy of Sciences. His appointment to succeed Dr. Clifford Furnas was made Jan. 27 when four new members were named.

President of New York State University at Buffalo, Dr. Furnas ended his term as DSB chairman Dec. 31 after serving since July 1961. From 1955 to 1957 he was Assistant Secretary of Defense for Research and Development.

Dr. Seitz has been associated with Defense R&D for about 25 years and has been a member of the DSB since 1958. The Board is chartered as the senior technical advisory body in the Department of Defense, serving Secretary of Defense McNamara through Dr. Harold Brown, Director of Defense Research and Engineering.

Members of the Board are appointed by the Secretary of Defense and are selected on the basis of their personal qualifications and experience. The newly appointed members are:

Prof. David T. Griggs, Institute of Geophysics and Planetary Physics, University of California at Los Angeles; Dr. Gerald M. McDonnel, Department of Radiology, UCLA at Los Angeles; Dr. L. Eugene Root, president of Lockheed Missile and Space Co.; Prof. Kenneth M. Watson, Physics Department, University of California at Berkeley.

New Book Dramatizes Arid Lands Water Development

Attempts to combat lack of water and develop arid areas of the United States are dramatized in a new book, *Aridity and Man*, published by the American Association for the Advancement of Science.

The 604-page volume, consisting of 74 contributions from 14 states, includes reports on U.S. arid lands anthropology, biology, weather, water, minerals and energy sources, soils, agriculture and Western political and social institutions.

In addition to the unifying opening and closing chapters, there is a critical review of man's use of his arid environment. The book features eight case studies on how water problems are being attacked in specific arid areas—most of the Western third of the Nation—including Los Angeles, California's Central Valley and Tucson, Ariz.

The volume was prepared as part of the U.S. contribution to the UNESCO "Scientific Conference on the Arid Lands of Latin America," held in Buenos Aires last September to help Latin Americans develop and utilize their arid areas.

The English language edition was preceded by one in Spanish, which was distributed at the Buenos Aires meeting. Support for the project came from the National Science Foundation, Agency for International Development and the American Association for the Advancement of Science.

The book, which contains 98 illustrations, may be obtained from the AAAS, 1515 Massachusetts Ave. N.W., Washington D.C. 20005.

Col B. R. Luczak

E. L. Smock

Col N. T. Dennis

Army Missile Command Effects Key Staff Changes

The Army's Mauler Missile System was placed under Col B. R. Luczak as project manager by Army Missile Command action announced Feb. 13. Since January 1963, he has been the Nike Hercules project manager.

Col Luczak, a veteran of 18 years of training in the missile business, replaces Col N. T. Dennis, who leaves for a new duty assignment as chief of the Cincinnati Procurement District. E. L. Smock, formerly deputy to Col Luczak, has been named acting project manager of Nike Hercules.

Assigned to the Army Missile Command in July 1962 as deputy to the commanding general of Air Defense Systems, Col Luczak served until he was picked to head the Nike Hercules Office. A native of Pittsburgh, Pa., he holds a B.S. degree in industrial engineering from the University of Pennsylvania and a master's degree in business administration from Stanford University.

Early in World War II, he directed the firing training programs of more than 100 heavy gun battalions and some 80,000 officers and enlisted men. A later assignment was operations officer for a 22,000-man force to destroy German V-1 rockets fired at Antwerp, Belgium.

At the end of the war, he was second in command of an antiaircraft bridgade on the German-Czechoslovakian border. He was awarded the Legion of Merit, Order of Leopold, Croix de Guerre and Fourragere of Belgium and French Croix de Guerre.

Since 1945 his only assignment not connected to the missile program was a 17-month tour in Korea as an Ordnance battalion commander. He has served as deputy commander of the Pacific Missile Range at Point Mugu, Calif., and as chief of the Integrated Range Mission at White Sands Missile Range, N. Mex.

Col Luczak is a graduate of the National War College and the author of a number of articles on the research, development and testing of missiles and rockets.

As acting project manager for the Nike Hercules program, Mr. Smock is backed by experience which began with work on guided bombs in 1943. He later went with the Naval Ordnance Test Station where the 2.75 rocket and Terrier missile were being developed. He came to Redstone Arsenal in 1952 and continued work on the Terrier.

He has served as deputy chief of Surface-to-Air Missile Systems and deputy chief of Technical Programs for Army Ordnance Missile Command.

Nike X Displaces Nike Zeus as Office Designation

Nike X was substitued for Nike Zeus in a recent redesignation of the Army's antimissile missile system project office at Missile Command Headquarters, Redstone Arsenal, Ala., and its field office on Kwajalein Island in the mid-Pacific.

The Nike X Project Office at Redstone is headed by Col I. O. Drewry, who had the same responsibility when it was the Nike Zeus office. Tests of hardware designed for the Nike Zeus system are continuing as part of the Nike X program.

The Nike X will incorporate two new radars, never before used in an Army missile system, and a new high acceleration missile called Sprint. The Zeus missile will be retained in the system.

Existing facilities on Kwajalein are being prepared for Nike X tests.

CHANGING OF SIGNS proclaims new name for the Army's biggest missile project at Redstone Arsenal, Ala., as Col I. O. Drewry shows a model of new Nike X headquarters designation to his secretary, Mrs. Wilodene Edwards.

250 Leaders Gather at RIA To Discuss Cost Reduction

Nearly 250 representatives from Government and industry gathered at Rock Island (Ill.) Arsenal early in February to discuss plans for implementing President Johnson's programs for increasing productivity and improving manpower utilization, particularly through work measurement methods.

Assistant Secretary of the Army (Installations and Logistics) Paul R. Ignatius was a featured speaker, along with Lt Gen Frank S. Besson, Jr., U.S. Army Materiel Command, and representatives from the Bureau of the Budget and various Department of Defense agencies.

Brig Gen Ryder Assigned Deputy Chief of R&D for International Programs

Brig Gen William T. Ryder, director of Special Weapons, OCRD since June 1962, was assigned Feb. 12 to a newly established position of Deputy Chief of Research and Development for International Programs.

Elevation of General Ryder to deputy CRD with direct supervision of the International Division, transferred simultaneously from the Directorate of Plans and Programs, attests to the growing importance of U.S. Army R&D cooperation with Free World allies.

Col James W. Milner, who had served as deputy director of Special Weapons under General Ryder, has been assigned as his successor.

Backed by 28 years of varied military assignments, General Ryder was graduated from the United States Military Academy in 1936. From 1956 to 1958, he was chief of the Technical Liaison Office, Office of the Chief of Research and Development in Washington, D.C., and then served four years as deputy chief of information at Supreme Headquarters, Allied Powers, Europe.

During World War II he served as parachute officer, 52nd Troop Carrier Wing, in North Africa and Sicily; regimental commander, 542 Parachute Infantry, Fort Benning, Ga.; assistant A-3, Hq., 5th AF, Southwest Pacific; assistant A-5, Hq., Far East AF, Southwest Pacific; and Chief of Staff, Western Visayan Task Force that took Mindoro Island in 1944.

In September 1945, he was assigned as executive officer and later deputy chief to the Economic and Scientific Section of GHQ, SCAP, in Tokyo, Japan. He later joined the G-3 Section of the Far East Command in Tokyo, then the G-3 Section of the X Corps that landed at Inchon in September 1950, during the Korean hostilities.

As a colonel in 1951, he attended the Strategic Intelligence School in Washington, D.C. In April 1952, he returned to Tokyo as Army attache to the U.S. Embassy until July 1955, when he returned to Washington for a one-year course at the National War College.

General Ryder's citations include the Bronze Star Medal (OLC), Legion of Merit (2nd OLC), Army Commendation Ribbon with medal pendant and the Philippine Medal for Merit.

COL MILNER, a native of Axtell, Tex., graduated from the U.S. Military Academy in 1940. He later earned an M.S.E. degree from the University of Michigan and attended the Command and General Staff College and the National War College.

Before his assignment as deputy director of Special Weapons, he served as commander of the 64th Artillery Group and earlier as division advisor, advisory G-3 ROK Army, and Chief of Staff for the Korean Military Assistance Group.

During World War II he participated in the Normandy, Northern France, Rhineland and Central Europe campaigns. He was awarded the Silver Star, Bronze Star Medal, Croix de Guerre de Luxembourg and the Verdun Medal.

Brig Gen William T. Ryder

Col James W. Milner

AMC, OTSG, ARO Life Sciences Leaders Convene

Laboratory representatives of the Army Material Command and Office of the Surgeon General held two recent meetings with Army Research Office staff members to discuss the Army life sciences research program.

Presiding at the conferences, held at Army Research Office Headquarters in Arlington, Va., were Col Tyron E. Huber, chief, and Dr. Carl Lamanna, deputy chief and scientific director, Life Sciences Division.

Installations represented included the Army Biological Laboratories Fort Detrick, Md.; Chemical R&D Laboratories, Edgewood, Md.; Army Natick Laboratories, Natick, Mass.; and the scientific staff of the Surgeon General's Research and Development Command.

Participants discussed agency research programs, emphasizing the scientific goals and recent achievements with little or no reference to the customary budgetary factors. Certain key areas were selected by the ARO staff for emphasis because of special problems, particularly interesting scientific achievements, or anticipated future administrative problems.

Important topics emphasized in the medical research program included: progress in research utilizing germ-free animals; current status of the malaria research program emphasizing drug-resistant strains; the search for protection against whole body irradiation effects; and infectious hepatitis research.

Special topics under investigation by Army Materiel Command laboratories which were highlighted are: radiation preservation of food; studies on flash blindness; new incapacitating chemical agents; and status of prophylaxis and treatment against chemical and biological agents.

Promotion Points to Benefit Of AE-R&D Career Programs

Career advancement opportunities provided through the Army's Atomic Energy and Research and Development Officer Specialist Programs, as reported in the Dec.-Jan. 1964 consolidated edition of this publication, have reached out to Lt Col Thomas G. Provenzano.

Notice of his recent promotion from the grade of major was received at the Oak Ridge (Tenn.) National Laboratory (ORNL), where he is on TDY as deputy technical director for a joint ORNL-Atomic Energy Commission-Armed Forces Radiobiology Research Institute project.

The effort is aimed at designing and fabricating a PIA (Positive Ion Accelerator) source of 14 Mev neutrons, to be used for studies of shield-radiation interactions, spatial and energy distributions, etc. The 14 Mev-PIA is expected to be the strongest source of its kind in existence.

SATCOM Agency Demonstrates New Satellite Communications

Where early Army Signal Corps pilots first reached for the sky under the tutelage of the Wright brothers, at historic Fort Myer, Va., the U.S. Army Satellite Communications (SATCOM) Agency recently unveiled its newest piece of equipment—a tiny, transportable, satellite communications terminal which can reach 22,300 miles into space and back.

Designed to communicate with the National Aeronautics and Space Administration's SYNCOM II, the world's first synchronous orbit communications satellite, the experimental terminal is known to SATCOM Agency engineers as the Mark IV(X) Highly-Transportable Communications Satellite Link Terminal. It was built by Hughes Aircraft Co., which also developed and built the SYNCOM satellite.

Accepted Dec. 13 by the SATCOM Agency, the terminal was flown from Culver City, Calif., to MacDill AFB, Fla., in a C-130 Hercules assault airlift aircraft and for five days was successfully demonstrated for the U.S. STRIKE Command.

Because the whole terminal with its operating crew can be loaded in one C-130 aircraft, the Mark IV(X) is of particular interest to STRIKE Command, which must stand ready to move combat-ready task forces to trouble spots anywhere in the world.

A militarized version of such a terminal could accompany a task force into an area where no communications complex exists, and within three hours after touchdown, could provide the task force commander with voice and teletype circuits via satellite back to STRIKE headquarters or to any point in CONUS.

Demonstrations at Fort Myer over an 11-day period were for the purpose of providing military communicators in the Washington area with an opportunity to see and use a very preliminary design of such a terminal.

Brig Gen J. Wilson Johnston, who commands the Army SATCOM Agency at Fort Monmouth, N.J., emphasizes that the Mark IV(X) is still in the "breadboard stage." A continuing series of tests will be conducted by the Agency, which has leased the terminal from Hughes with an option to purchase. If tests continue to be successful, the next stage would be the development of a prototype model, militarized but not yet "optimized" for tactical military use in the field.

The Honorable George P. Miller, chairman of the House Standing Committee on Science and Astronautics, talks over circuit from terminal at Fort Myer, Va., through the SYNCOM II satellite (in orbit at 22,300 miles altitude over the Atlantic Ocean near Brazil) to the SATCOM's west coast station at Camp Roberts, Calif., a distance of almost 50,000 miles.

The Washington demonstration was intended primarily for military and Federal Government communications staffs, and thus was not widely publicized. Among the visitors were members of the House of Representatives Science and Astronautics Committee and the House Appropriations Committee.

The demonstration consisted of short briefings presented by General Johnston and by SATCOM Agency staff members Col Howard E. Porter, Col Robert C. Barthle and James P. McNaul. Visitors were then shown the terminal and were given an opportunity to talk over a circuit extending from the terminal through the SYNCOM II satellite and thence to SATCOM's West Coast fixed station at Camp Roberts, Calif.

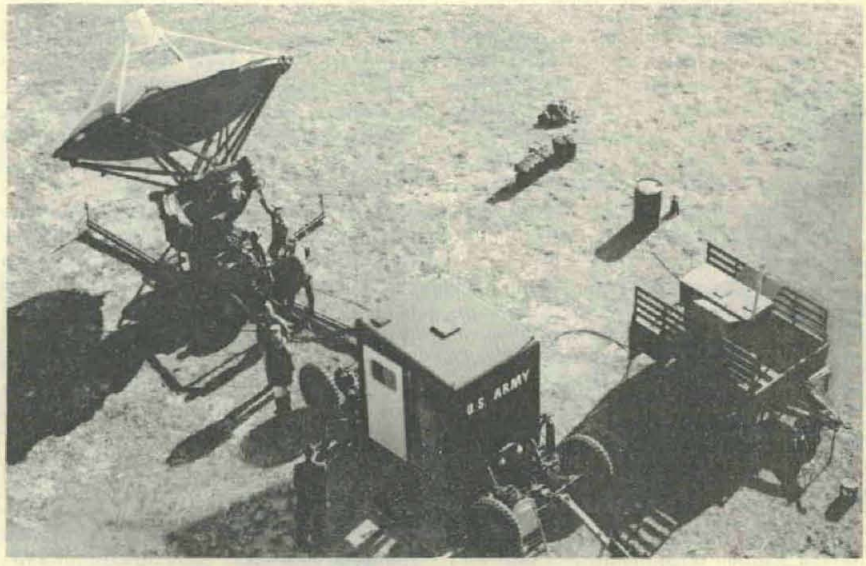
Manning the phone at that end was Lt Col Wilfred St. George, SATCOM Station Commander at Camp Roberts, who estimates that he chatted with upwards of a thousand people over the 2-week period.

Teletype circuits were demonstrated simultaneously with the full-duplex voice conversations. Photographs were also sent via the satellite circuit using standard Army facsimile equipment.

The complete air-transportable terminal system includes a power unit, a transmitter and receiver system mounted in a shelter and a compact air-inflated 15-foot antenna which can be collapsed for movement and which weighs only 4,400 pounds.

SYNCOM II is the world's first synchronous-orbit satellite. Launched by NASA on July 26, 1963, it has been in orbit 22,300 miles over the Atlantic Ocean near Brazil since that time. It keeps pace with the rotation of the earth and thus appears to be nearly stationary in relation to a point on earth.

In theory, three SYNCOM satellites in continuous orbit and in proper



SATCOM Agency's link terminal includes a 15-foot, air-inflated antenna, a control and equipment shelter, and a trailer-mounted 15 kilowatt generator.

position could provide a complete, continuous communications link to all parts of the globe except the polar regions.

The Pacific and Southeast Asia areas presently offer difficult problems because of atmospheric disturbances, the monsoon seasons, the long stretches of water where no relay points can be established, and the relatively undeveloped communications systems.

General Johnston and his SATCOM Agency engineers believe that satellite communications could eventually solve problems such as these. Satellite circuits do not fade as do high frequency radio circuits and are not seriously affected by atmospheric disturbances, sun spots or other propagation problems. Besides, successful satellite circuits could eliminate many miles of cables and countless ground relay stations.

The Army SATCOM Agency, in carrying out the Army's portion of the Department of Defense Communications Satellite Program, is responsible for the development of the surface environment for testing the communications capabilities of satellites.

SATCOM, which reports through the Army Materiel Command, has fixed and transportable stations at Fort Dix and Lakehurst, N.J., at Camp Roberts, Calif., and a shipboard terminal aboard the *USNS Kingsport*. Along with one of SATCOM's transportable stations, the latter terminal soon will be deployed to the Pacific to support NASA's approaching launch of SYNCOM III.

Ad Infinitum, Distribution Problems Plague Staff

Seldom a working day passes without the editorial staff of this publication being pestered by calls from persons complaining that they have not received copies, or asking how to be put on distribution.

Whenever complaints are bucked by the editor to the distribution personnel in the Office of The Adjutant General, the stoutly defended contention is that the "pinpoint distribution system" is as near a perfect method as is within the ability of man to conceive—if only people in the field would read the regulations and instructions, and follow them!"

Every issue of this publication, in the masthead statement on page 2, column 1, devotes five paragraphs to explaining the distribution system and the public subscription sale through the Government Printing Office. Numerous special articles, such as this, have supplemented that information during the more than three years the publication has been issued.

Still, week after week, the editor devotes an average of four to five hours answering telephone calls and replying to letters about distribution of the Newsmagazine. In desperation, he asks himself: "What can I do?"

Well, for one thing, he can (and does!) humbly beseech all those who have complaints about distribution, or questions about how to be placed on distribution, to carry their troubles to the printing control officer in the agency where they are employed. He, in turn, can take the problem to the Army's nearest distribution center.

As long as a request is properly submitted on DA Form 12-4, there is no limitation on the number of copies an Army agency may receive. Bulk lot distribution is made to each agency, and it is the responsibility of the agency printing control officer to insure adequate distribution to all personnel.

DoD Moves to Keep Intact Skilled Development Teams

A policy statement directed toward the retention of skilled development teams when major contracts or programs are terminated was announced Jan. 24 by the Department of Defense.

Instructions to avoid breaking up highly specialized teams and losing the on-going value of their work were issued in a memorandum from the Deputy Secretary of Defense to Secretaries of the Departments of the Army, Navy and Air Force. They require an examination of each major contract termination to:

- Exclude from the termination, work of continuing value to the Government;
- Identify additional work requiring these skills and expedite placement contracts which, in the normal course, would be awarded to the organizations employing them.

The memorandum specified that reviews of proposed terminations under this policy should give equal consideration to skills of first-tier sub-contractors.

The Military Departments will be required to submit detailed plans in accordance with the policy memorandum as quickly as possible and in any event within 45 days after decision to terminate a major project.

By R. G. H. Siu

SCHEDULING DEVELOPMENTS. Talking about responsiveness to customer's needs in the development of new hardware, my learned friend reminded me of the recollections of Nahum Ish Gamzu in *The Talmud.* Said Nahum:

I was once traveling to the house of my father-in-law, taking with me three donkey-loads of food and drink. A starving man asked me for food. I answered that I would give him some when I unloaded, but beforeI could do so, he fell dead. I greatly grieved over his death, and prayed that the Lord send sufferings upon me in expiation for my sin. I should not have delayed my help, but should have cut through the load and given him food at once.

HE DON'T DIG IT! In these days of the hurly burly, most people have the time to listen but not hear, to look but not see, to read but not learn. About the last, Ruskin had the following to say:

. . . if the author is worth anything, . . . you will not get at his meaning all at once—nay, . . . at his whole meaning you will not for a long time arrive in any wise. Not that he does not say what he means and in strong-words too; but he cannot say it all and what is more strange, will not, but in a hidden way and in parable, in order that he may be sure you want it. I cannot see quite the reason of this, nor analyze that cruel reticence in the breasts of wise men which makes them always hide their deeper thoughts. They do not give it to you by way of help, but of reward, and will make themselves sure that you deserve it before they allow you to reach it.

PEA-DROPPING. Some people have the art of knowing just when to leave a lost decision alone. Others never learn and resort to all sorts of echelon-hopping with the hope of recovering it, sooner or later finding themselves in the plight of Tolstoy's monkey.

A monkey was carrying two handfuls of peas. One little pea dropped out. He tried to pick it up, and split 20. He tried to pick up the 20 and split all. Then he lost his temper, scattered the peas in all directions, and ran away.

White Sands Missile Range Veteran Began Career With 'Father of Rocketry'

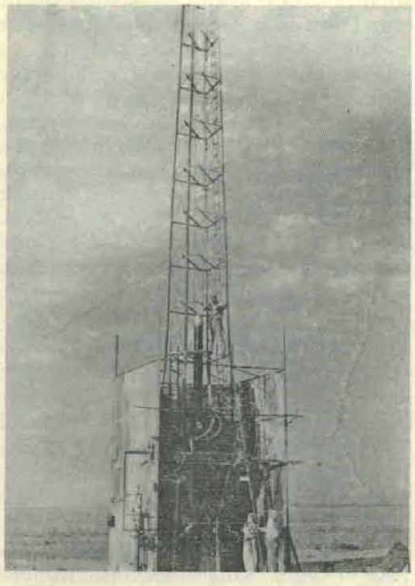
White Sands (N. Mex.) Missile Range has an engineer who worked in missilry back when an alarm clock's mainspring was used to generate power for a missile test recording instrument.

Charles W. Mansur, aerospace engineer in the Rocket Vehicle Laboratory, Army Missile Test and Evaluation Directorate at WSMR, swept floors as a boy in Dr. Robert H. Goddard's laboratories.

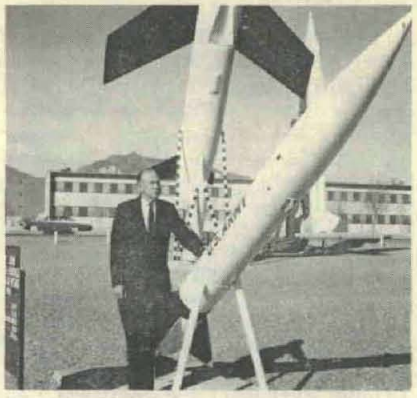
Now Mansur works at the Nation's only overland missile range, covering an area more than half the size of Massachusetts.

Although his work in experimental rocketry dates back to the beginning of the century, Dr. Goddard, the "father of modern rocketry," was head of the Sciences Department at Clark University, Worcester, Mass., in the early 1920s when Mansur was attending grammar school just across the street. That gave him his first glimpse of the career that has taken him through more than three decades of missilry.

In high school, Mansur worked as a laboratory assistant at the university, still on the fringe of the field which had completely captivated his imagination. After graduation, he went on to other employment, but still found excuse to visit the laboratory. In 1929, he finally went to work for



EARLY PHOTO (May 1937) provided by Mrs. R. H. Goddard, widow of the "father of missilry," shows WSMR workers putting last-minute touches to rocket in 60-foot launching tower.



Charles W. Mansur

Dr. Goddard, the man he had so long admired.

Attempts to launch rockets in Massachusetts met with unfavorable reaction but ironically the adverse publicity worked to Dr. Goddard's advantage.

Col Charles E. Lindberg became interested in Goddard's work and was instrumental in obtaining a grant for the scientist from the Daniel and Florence Guggenheim Foundation. Until this time, Dr. Goddard had depended either upon his own resources or small grants to carry on his experiments.

Goddard, on sabbatical leave from Clark University, selected Roswell, N. Mex., as the ideal location for intensified continuation of his work because of the climate and isolation.

Machine tools and other equipment were loaned to Goddard by the university and shipped to New Mexico. Four men including Mansur were the first group to go to Roswell with Dr. Goddard in 1930 to begin in earnest full-time concentration on projects which, up to now, had received only part-time attention.

Mansur recalls the excitement at the time. He says, "We were really enthusiastic and the fact that we had to start from scratch, even to helping build our own machine shop, did not dampen our spirits a bit."

The shop, 35 by 50 feet, was about four miles north of Roswell. The 60-foot launching tower was put up seven miles further at Eden Valley. Later, after the tower was blown down during one of the severe sand storms of the early 30s, they added another 20 feet to it.

Work began with the men designing and building launching equipment and actual rocket components. "There was no such thing as a countdown in those days," recalls Mansur. "When we were ready to fire, we fired!"

For two years, the men developed, experimented and perfected rockets of size similar to the rocket they brought from the east. An observation point, a veritable cellar door dugout complete with peek holes about 50 feet from the launching tower, provided a "close" look at the launchings.

At the height of the depression in 1932, the funding stopped and Dr. Goddard returned to the university and his academic work, able to devote only spare hours to his experiments.

Mansur was fortunate to get a job during these lean times, but always managed to return to the laboratories at odd hours and find work to do. Vividly he recalls late one midsummer night in 1934 when Dr. Goddard called and asked him if he were ready to return to Roswell and rocketry. He lost no time assuring him he was. This time three of the original crew returned to New Mexico.

For the next six years, they intensified their efforts and chalked up many firings. They improvised. "When we needed a new instrument or tool," Mansur said, "we made it. We depended upon Dr. Goddard for instructions. There were no technical manuals on missilry then . . . they hadn't been written yet."

During this time, Dr. Goddard devised gyroscope control of test missiles and worked on movable vanes in the rocket exhaust as a guidance control. Their work went unheralded—as Dr. Goddard wished—and they

ASA Bundy Names Deputies For International Programs

Two new deputies to William P. Bundy, Assistant Secretary of Defense for International Security Affairs, were sworn in Feb. 7.

Henry J. Kuss, Jr., was assigned as Deputy Assistant Secretary of Defense for International Logistics Negotiations, and William E. Lang as Deputy Assistant Secretary of Defense for Overseas Forces and Facilities.

Mr. Kuss is responsible for the planning and negotiation of logistics arrangements with foreign countries and international organizations which will serve U.S. military, political and economic objectives. Mr. Lang is responsible primarily for politico-military matters dealing with the deployment of U.S. Forces overseas and related balance of payments matters.

carried on operations without interruptions or publicity. However, in 1940 the Army enlisted their aid to conduct research on methods of getting heavily loaded aircraft airborne.

The Navy took Dr. Goddard and his crew under contract in 1942 and operations were transferred to Annapolis, where work continued until Dr. Goddard's death in 1945.

Prior to his death, Dr. Goddard had completed negotiations with Curtis-Wright Corp. for assistance in establishing their missile program. The contract remained in effect and Mansur was one of those to transfer to the company.

Seven years later he accepted a job at White Sands Missile Range in the Propulsion Branch as a laboratory mechanic. He has seen missilry grow from the days when a rocket's performance in flight was barely documented until today when giant radars and intricate machines record every inch of the missile's journey.

"It is unbelievable," Mansur reflected, "that the Federal Aviation Agency has had to issue regulations about rockets fired by amateur rocket clubs because their rockets may shoot down aircraft. Some can reach altitudes of five miles. Why, when we had our first successful firing on Dec. 31, 1930 at Roswell, it went up less than half a mile.

"In 35 years of missilry," he says, "I have seen some remarkable things come about, based entirely on Dr. Goddard's principles and his work. I have had an interesting career, still do, and plan to remain at White Sands."

Engineer Labs Revive Series Of Top Management Lectures

A guest speaker series of monthly lectures featuring authorities in the field of management is being reinstituted by the U. S. Army Mobility Command Engineer Research and Development Laboratories, Fort Belvoir, Va.

The series was started in 1957 as a part of its employee development program, but was dropped after several years. In its reactivated form, it will provide a means of self-improvement to those who may be called upon to fill higher level jobs as retirement makes inroads in top-level management. Personnel at Section Chief level and above may attend.

Prof. Roger L. Harrison, professor of psychology at Yale University, will speak on "Interpersonal Relationships" at the first lecture Mar. 10.

Army Dental Corps Plans Clinical Research Program

Top military and civilian leaders in oral and general surgery, oral and orthopedic pathology and the basic sciences met in the Army Surgeon's Office, Feb. 28, to structure a new clinical research program.

Sponsored by the U.S. Army Dental Corps, the program is aimed at improving field methods for treating combat maxillofacial and oral injuries, which have increased steadily in land warfare during this century. The increase is attributable to changing characteristics of weapons, use of body armor and decreasing mortality from other casualties.

Excellent functional and esthetic results from oral surgery in permanent military and civilian hospitals are the product of complex procedures. Oral surgery in field medical facilities serving mobile ground combat units, especially forces isolated from normal chains of evacuation, requires simplified procedures. Continuous development of evacuation methods is also a prime requirement.

Maj Gen Joseph L. Bernier, DC, chief of Army Dental Corps, headed the list of military leaders of the meeting, including Col James E. Chipps, DC, oral surgical consultant, USAREUR; Col William B. Irby, DC, chief of Dental Service, Letterman General Hospital, San Francisco, Calif.; Col George W. Burnett, DC, U.S. Army Institute of Dental Reseach, Washington, D.C.;

Col Niles Sondergaard, DC, U.S. Army Combat Developments Command, Brooke Army Medical Center, Fort Sam Houston, Tex.; Lt Col Charles C. Alling, DC, chief of Military Dentistry Research Branch, U.S. Army Medical R&D Command; and Lt Col Peter M. Margetis, DC, U.S. Army Medical Biomechanical Research Laboratory, Walter Reed Army Medical Center, Washington, D.C.

Civilians who attended were Dr. Hamilton B. G. Robinson, Kansas City; Dr. Wallace D. Armstrong, Minneapolis; Dr. James R. Hayward and Dr. Donald Kerr, Ann Arbor, Mich.; Dr. Thomas S. Torgerson, Detroit; Dr. Merle Hale, Iowa City, Iowa;

Dr. Sanford M. Moose, San Francisco; Dr. Kurt H. Thoma, Boston; Dr. Robert V. Walker, Dallas; Dr. Thomas J. Cook, Miami; Dr. Lent C. Johnson, Armed Forces Institute of Pathology, Washington, D.C.; and Dr. Sholom Pearlmon of the American Dental Association.

House Research Committee Selects Advisory Panel

Selection of a 14-member science-engineering advisory panel to assist the Select House Committee on Government Research was announced Feb. 15.

Comprised of some of the Nation's top industrial and scientific leaders, the Panel will advise the Committee in performance of investigative responsibilities set forth in House Resolution 504, 88th Congress, 1st Session.

Headed by Carl Elliot (D.–Ala.), the 9-member Committee is operating in temporary offices in Escanaba Hall at 900 Independence Ave., S.W., Washington, D.C. Dr. Robert Hopper is staff director, and William B. Farrington's appointment as science director was announced by Chairman Elliott Feb. 15.

It is charged with responsibility to "make a complete, full, and thorough investigation of the numerous research programs being conducted by sundry departments and agencies of the Federal Government. . . ."

The Committee is required to report its findings to the House with such recommended legislation as it may deem appropriate to correct any deficiencies prior to Dec. 1, 1964. Recommended legislation will seek to "coordinate and prevent unjustifiable duplication in the numerous projects and activities of the Government relating to scientific research. . . ."

The Advisory Panel consists of: George W. Beadle, president, University of Chicago; J. W. Beams, University of Virginia physics professor; Lloyd V. Berkner, president, Graduate Research Center of the Southwest; Robert C. Berson, dean, South Texas Medical School; Henry T. Heald, president, Ford Foundation; Pendleton Herring, president, Social Science Research Council;

August B. Kinzel, vice president, Union Carbide Corp.; John H. Rubel, vice president, Litton Industries and until late in 1963 was Deputy Director of Defense Research and Engineering; Albert B. Sabin, Children's Hospital Research Foundation, University of Cincinnati; R. V. Smith, dean, Agriculture School, Auburn University;

Elvis J. Stahr, former Secretary of the Army and now president, University of Indiana; Max Tischler, president, Merck, Sharp and Dohme, research laboratories; Charles H. Townes, provost, Massachusetts Institude of Technology; Donald Douglas, Jr., president, Douglas Aircraft Corp.

BILCO Automates Redstone Arsenal Info Check on Vendors

BILCO has stepped to the front and center at the U.S. Army Missile Command's Redstone (Ala.) Arsenal—but not the sergeant of TV renown. In fact, this BILCO has nothing whatsoever to do with entertainment—can't sing, dance or act like a comic.

Bidder's List Control is the long term for Redstone's Bilco, and it is the designation of a mechanized system that selects in seconds a list of vendors qualified to bid on a contract to supply a particular item.

The push of an electric switch button produces, almost faster than you can say Bidder's List Application, a wealth of information on hundreds of private industries, what they are capable of producing, and pertinent supporting information.

Playing major roles in the development of the new system, which became operational Jan. 3, were P. L. Moring of Procurement Operations; Jim Terry of ADPS (Automatic Data Processing System) and O. M. McCaddon of the Plans and Services Office as well as a host of other staff workers in each of these divisions.

The assignment was carried out at no added expense to the Government because it was created with existing equipment, and it will result in savings, P&P personnel say, in both time and money.

Vendors who feel they have a product the Government can use may get on a bidder's source list by sending a request for consideration to the Procurement and Production Directorate of the Army Missile Command at Redstone Arsenal. Background information on the companies and what they can supply is fed into a computer where it is recorded on master tape records.

Col E. V. Lau, director of Procurement and Production, sets in motion Army Missile Command's new mechanized system for selecting vendors. Looking on are men who were instrumental in the system's development, (from left) Jim Terry, O. M. McCaddon, Austin Couch, and P. L. Moring.

When a request for a particular product is initiated, P&P determines if the requirement will be formally advertised for bids or opened to competitive negotiation. The procuring element then obtains a list of qualified bidders by completing a Bidder's Request Card.

This list of qualified bidders is rotated to insure that all vendors have an oportunity to bid in their particular category. Information is furnished to procurement by means of a mechanized printout which includes gummed labels for each bidder appearing on the list and the name of the last successful supplier.

P&P then forwards the list and gummed labels to the procuring element which, in turn, forwards an invitation for bids or a request for proposal to selected vendors.

After a specified period of time, ADPS will produce a Bidder's List Control Card for annotation of the type of action taken by the procuring element. This Bilco card carries the name of the last successful bidder on a particular item for obvious reasons —the vendor supplying the item at the lowest cost before might again be prepared to do the job for less when the need arises.

Advantages of this mechanized system are many, but the primary features are the tremendous savings in manhours per year as well as the rotation of vendors, giving all a fair shake in the bidding competition.

The system has inquiry and follow up capabilities as well as useful data on various companies such as large or small business, security clearance, kind of business, labor surplus area and Army procurement district.

Col E. V. Lau, director of Procurement and Production, termed the new system a step in the right direction in keeping with the cost-reduction program stressed by Defense Secretary Robert McNamara.

"If gives us greater management effectiveness at no increase in cost," he said. "It also enables us to achieve increased impartiality in respect to giving vendors an opportunity to bid in their respective categories."

ERDL Testing Centrifugal Pump For Hoseline, Oil Barge Usage

A self-priming, centrifugal pump is being tested as a flood pump for the 4-inch military hoseline system by the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va.

The pump may be used also for petroleum barge and lighter unloading. In this application it is designed to supply 350 g.p.m. of 0.740 specific gravity gasoline at 190-foot head, with an alternate operating point of 500 g.p.m. When used as a flood pump, it furnishes 225 g.p.m. at 200-foot head.

Weighing only 605 pounds, the pump is mounted on aluminum skids and may be delivered to the site by either a light-type helicopter or by light truck. Designated Model 03F–MVH4D, it is powered by a 4-cycle, 4-cylinder, air-cooled gasoline engine and is manufactured by Gorman-Rupp Co., Mansfield, Ohio.

Army BioLab Scientists Speak At U.S. Public Health Symposium

Three scientists of the Army Biological Laboratories at Fort Detrick, Md., participated in a recent 3-day symposium on botulism sponsored by the U.S. Public Health Service and held at Cincinnati, Ohio.

Arrangements for the parley were made by the PHS Division of Environmental Engineering and Food Protection and by the Robert A. Taft Sanitary Engineering Center in Cincinnati.

Dr Harold N. Glassman, assistant scientific director of the BioLabs, acted as moderator for the session on toxins, and two of his coworkers, Dr. Edward J. Schantz and Matteo A. Cardella, gave presentations. Dr. Schantz spoke on methods of isolation and purification while Mr. Cardella discussed methods of producing toxoids for immunization.

Working Groups Report Progress on 12 DIAC Studies

The Defense Industry Advisory Council (DIAC) heard a dozen progress reports on studies for more effective relationships between the Department of Defense and industry at a meeting in Washington, D.C., Feb. 7-8.

Established in May 1962, DIAC enables the Secretary of Defense and his principal advisers to meet with top-level industrial leaders to discuss and act on problems of mutual concern. The 22 non-Government members are representative of all types of industries engaged in defense contracts.

Deputy Secretary of Defense Cyrus R. Vance, until recently the Secretary of the Army, presided for the first time as chairman of the Council. Thomas L. Morris, new Assistant Secretary of Defense (Installations and Logistics) is alternate chairman and Samuel W. Crosby is executive secretary.

When the DIAC convened for the fifth time last September, Secretary of Defense Robert S. McNamara served notice that increased profits for industry must be linked to improved efficiency. Simultaneously with the sixth meeting, the DoD mailed out guidelines for 100 prime contractors on cost reduction plans by which the Government aims to achieve savings of $4 billion by 1965.

Some of the progress reports considered Feb. 7–8 were initiated last fall and spring, and many will not be in final recommendation form for publication until after the DIAC meeting in May.

The Subcommittee on Relaxing of Administrative Controls on Contracts recommended that controls be relaxed on all contracts, and that the Army and Navy study the possibility of action patterned after that effected experimentally by the Air Force.

Some of the controls which might be lessened, it was stated, would be those concerning overtime and extra pay shifts and multiple shift work. Amounts of relaxation would apply in various degrees to different types of contracts and working situations.

Another subcommittee still is working to draft legislation concerning the risks involved in procurement of unusually hazardous materials and equipment.

Reports are still coming in on the program for Contractor Performance Evaluation. A Defense Department spokesman said it is hoped the reports will be complete by July 1. Ultimate goal of the program is a data bank on contractor performance evaluation available for all military services in considering R&D capabilities.

A group was set up at the September DIAC meeting to study unallowable costs on contracts and discussion on this subject at the February session was lively. The group has not yet been able to agree on what should or should not be an allowable cost.

Another study group was set up at the September Council meeting on criteria for furnishing production facilities. The report pointed out that the Defense Department has an enormous investment in production facilities, such as machine tools and plants. The DoD wants industry to share more of the costs to maintain these production facilities. A policy statement in the near future is projected for incorporation into the Armed Services Procurement Regulations (ASPR).

A study also is being made to see if military exports can be encouraged, with the hope that this might help the drain on U.S. gold. Much has been accomplished in this study, a Defense spokesman said, and an ASPR revision is forthcoming to make it easier to export weapons to friendly countries.

The group studying socio-economic effects of defense procurement was not able to determine any concrete solutions but, after evaluation of several existing studies on this subject, recommended that no additional studies be undertaken.

The Joint Industry-Defense Training Subcommittee, one of first established (October 1962), continues its study to have industry and Government officials receive the same procurement instructions. The main stumbling block at this time, it was reported, is that the survey of industry has not been completed.

What is sought is an expansion of the Program Evaluation Review Technique (PERT) cost reduction system on a wider industry-organized basis.

The Council approved the new proposals of the working group on specification simplification. They have been sent to Secretary of Defense McNamara who expressed dissatisfaction with previous proposals and directed more specific action.

Some specifications now on the books are obsolete and others need revision. The study group is working on a procedure for periodic, organized revision of all specifications and a set date for declaration of obsolescence.

Maj Benson Cited for AEC-Army Reactor Concepts

Official recognition for establishing a major development program for the Army's mobile nuclear reactor system and initiating the Nuclear Energy Depot Concept project rewarded Maj Thomas E. Benson at a recent ceremony. The latter project was the basis of an article in the Dec.-Jan. 1964 issue of this publication.

Maj Thomas E. Benson receives Army Commendation Medal from Maj Gen J. Stanley Holtoner, USAF, for outstanding service while serving with AEC/Army Nuclear Power Program.

Maj Gen J. Stanley Holtoner, USAF, commandant of the Armed Forces Staff College in Norfolk, Va., presented the Army Commendation Medal to Maj Benson just prior to his graduation from the AFSC. Maj Benson's new assignment is with the Military Assistance Advisory Group in Viet Nam.

The accompanying citation credited Maj Benson for outstanding service while with the joint Atomic Energy Commission-U.S. Army program for the development of nuclear reactor systems to support military land operations.

Prior to his selection to attend the Armed Forces Staff College, Maj Benson was assigned to the U.S. Army Engineer Reactor Group at Fort Belvoir, Va. The AEC/Army Nuclear Power Program is an association of effort to work toward Department of Defense objectives in development of nuclear power plants for remote area military needs.

Munitions Command Emphasizes Reliability Factors

(Continued from page 2)

storage, we have established programs for continuing sampling. Samples are subjected to laboratory and performance tests designed to measure continuing capability of the stockpiled ammunition to perform in accordance with design intent.

Where items are of relatively low dollar value, performance testing in real environments is emphasized. The laboratory is used to disclose the cause of performance deficiencies noted. High dollar value items, in contrast, are tested in the laboratory in as nondestructive a manner as is possible. However, small samples are destructively tested in the real environment to provide assurance that laboratory results indicative of stockpile adequacy are not grossly in error.

The wisdom of this course of action was proven recently in the testing of a nuclear weapon system wherein an incompatibility between certain components, not discloseable in prescribed laboratory tests, was uncovered in the firing of a 5-round sample of the end item (less nuclear material).

In the Munitions Command, being continually cost-conscious, we endeavor to obtain maximum information with minimum expenditure of highly valuable materiel. For example, our tests of the warhead sections for guided missiles and large rockets are combined with the annual service practice (training and qualification) firings conducted by the using troops. This avoids the procurement and expenditure of costly missiles and rockets purely for our testing purposes and has the further benefit of making training more realistic by providing the war reserve item itself rather than a training counterpart.

The requirement for expenditure of material is further minimized by utilizing in our evaluations of stockpiled material all available data, inclusive of experience from training usage of ammunition, user reports on adequacy of materiel, results of depot inspections of materiel in storage, etc.

Finally, all of our collected experience is made a matter of record and through a feed-back system, aided by computerized automatic data processing techniques, is made available to all interested agencies involved in the ammunition life-cycle. Knowledge based on experience is directed toward providing even better ammunition to the world's best soldier.

Soviets Step Up Laser Research

Translations from Soviet newspapers and journals indicate intensified research effort in Lasers, microcircuitry and radiation-proof electronics, all areas of major U.S. effort.

The Foreign Technical Translation Department of Electro-Optical Systems, Inc., reports on current Russian research trends in its "Soviet Science in the News" publication dated Jan. 17, 1964.

The newsletter states that Soviet scientists have been having diffculty with ruby Laser emissions and are seeking more efficient chelate, glass crystal and semiconductor materials.

Rock Island Arsenal Improves Trainfire Targets

U.S. Army marksmen will be shooting at paper targets that no longer "play dead" with issuance of the 1964 supply of Trainfire targets developed primarily through efforts of Rock Island (Ill.) Arsenal.

When Task Trainfire began, the Army used the old cardboard targets that had been used for years on known-distance and transition ranges. In wet weather, even before the firing started, the targets curled and played "dead" so shooters couldn't see them.

To solve the problem, the Army was about to adopt and buy 2½ million weather-resistant, fiberglass targets. Then the Army Weapons Command was asked to take a second look. Whereas the old cardboard target had cost 17 cents each, the fiberglass replacements were going to cost the Army about $2 each, or about $5 million for the 2½ million targets.

AWC scientists decided they could come up with a suitable cheaper target. Purchase of the fiberglass targets was called off and the old ones were used while the AWC attacked the developmental problem.

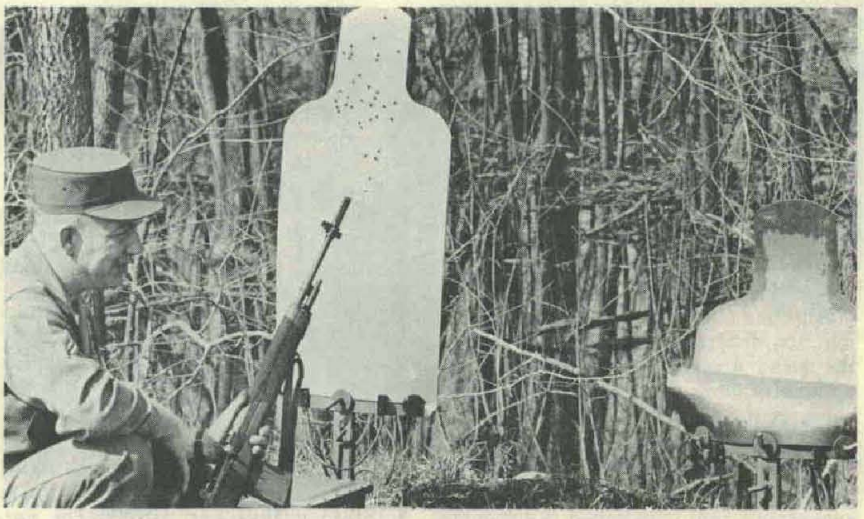
Rock Island Arsenal scientists studied the Trainfire course and the weather conditions in which targets would be used. Then the Fibers Materials unit developed specifications for a new target.

Working with firms in the paperboard industry, the Arsenal scientific team pushed the search for a weather-resistant material to serve the need for a rugged, more economical target.

The solution was a high-sulfate, fiber-content target treated with water-resistant resins. Layers of paper were laminated with high wet-strength adhesives, then coated with a special weather-resistant poly-ethylene and thermoplastic formula.

Field testing of almost 2½ million of the 27-cents-each targets in Trainfire during 1963 produced such satisfactory results that the Arsenal recently signed a contract for almost 1.7 million more.

The newly ordered targets will cost a little more than 23 cents each—still more of a saving for the Army's marksmanship program.



Cpl Edward Riker compares lightweight Trainfire target that will withstand almost all weather conditions with curled-up target at right it will displace.

Army Readout Station Prints Facsimiles From Tiros Satellite

NASA's Tiros VIII weather satellite is giving an Army-designed, van-mounted readout station an opportunity to demonstrate its wide capability of printing out facsimile pictures transmitted from high altitudes.

Designed and assembled by the U.S. Army Electronics Research and Development Laboratories at Fort Monmouth, N.J., the station uses the AN/GXC–4 (XC–1) high-speed Polaroid facsimile set. Developed by the Laboratories for eventual application to field army requirements, the set is currently undergoing service tests.

Participation of the Laboratories in the Tiros VIII operation is producing an extra dividend. While aiding NASA's continuing development of readout techniques for nonmilitary satellites, the operation is providing the Army with valuable new information for further evaluation of Automatic Picture Transmission (APT) for potential military applications.

The newest Tiros, developed by the National Aeronautics and Space Administration Goddard Space Flight Center, was launched Dec. 21 at Cape Kennedy, Fla. The Army, Air Force, Navy and U.S. Weather Bureau are contributing to the NASA program, which has the broad aim of providing faster and better global forecasting at reduced cost.

Satellites in the highly successful Tiros series have until recently depended exclusively on data readout systems in which video pictures have been stored on tape recorders aboard the vehicles. A long series of photos was transmitted during periodic passes upon receiving playback commands from three major ground stations located on the East and West Coasts and in Alaska.

This method, in which the photographs are received in negative form and then developed into positive prints, has been retained in the dual system being used by Tiros VIII. In the new readout system, however, the facsimile sets print out the weather pictures of their particular sector as they are obtained by the satellite. Some 50 of these facsimile-equipped stations are scattered around much of the globe.

(The playback technique was used when the first Tiros, developed for NASA under the technical direction of the Fort Monmouth Laboratories, went into orbit on Apr. 1, 1960. This was 14 months after the world's first meteorological satellite, Vanguard II, also developed by the Fort Monmouth Labs, was put in orbit on Feb. 17, 1959.)

TRIMMING - UP facsimile - equipped portable readout station are Kenneth C. Steelman, Army participant (outside), William Richards (inside) Neal Atkinson (l., roof) and Ulysses Smith.

Two stations have been set up at Fort Monmouth. The Army unit is designed for easy transport, and the van in which it is contained can be airlifted or carried on a 2½-ton truck. The second system was developed by NASA for fixed-site use.

In the Automatic Picture Transmission process, weather picture signals are stored within the vidicon-tube camera and then scanned out and automatically transmitted for reception by the ground stations within range. The facsimile sets turn out a finished print in 200 seconds. Automatically repeated, the entire APT cycle requires 208 seconds.

Tiros VIII scans an area approximately 800 miles square. When the satellite is directly overhead, or nearly so, during a pass, a half dozen pictures can be received by a station. The system was planned to produce a certain amount of overlap between pictures.

The GXC–4 facsimile set comprises a transmitter unit as well as a receiver. It has been used for some time by NASA and the Weather Bureau to relay weather pictures from satellite ground stations to weather offices around the country. Until recently, it had not been used to receive such photographs directly from a satellite. The set also readily transmits Polaroid prints of the scopes of weather radars.

The van housing the Army's portable station is the S–109 electrical equipment shelter, which was slightly modified for the special purpose. A tape recorder is used for backup data storage. A helix antenna atop the van can be retracted through a trap in the roof by a modified forklift mechanism. Other essential equipment includes a telemetry receiver.

Meantime, another of the Army's GXC–4 facsimile sets has been printing out pictures from Tiros VIII at the Labs' Deal observation center; a CPS–9 weather radar set has been scanning cloud formations over distances ranging out to 250 miles; and additional data have been obtained from balloons launched by the Fort Monmouth Meteorological Team.

Information from these various sources has provided engineers with checks for perfecting the picture reception and analysis techniques.

As already disclosed by NASA, the facsimile readout method was designed for eventual use in the projected Nimbus meteorological program. However, Tiros VIII has provided a means for initial tests.

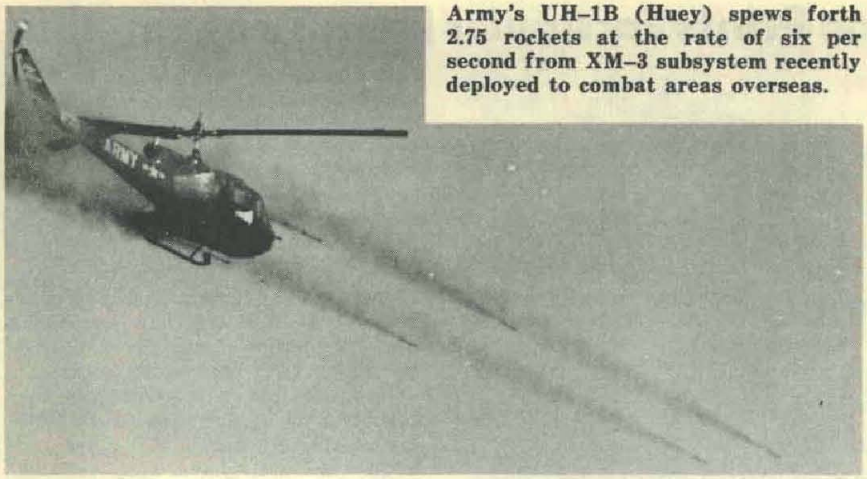
Kenneth C. Steelman, in charge of the Laboratories' participation in the APT program, is chief of the Meteorological Instrumentation Branch and is acting deputy director of the Meteorological Division in the Surveillance Department.

Design and development of the GXC–4 Polaroid facsimile set was headed by John Erhart, an engineer in the Communications Department.

Other employees of the Laboratories who have worked on the portable readout system with Mr. Steelman include Neal Atkinson, who was project engineer in designing and fitting out the van; Arnold Peterson, who has been engaged in related work; and Ulysses Smith, who is working with Mr. Peterson. The Engineering Sciences Department helped fit out the van.

William Richards is in direct charge of meteorological analysis techniques. Roland Waite is directing operation of the NASA fixed-site station. Working with him are George Etzel and Earl Grant.

At the Deal radio propagation center, which is part of the Labs' Institute for Exploratory Research, Lloyd Manamon is in charge of operations. He is being aided by Jack Wills, Vincent Suhoski, Lawrence Martin, and Paul Gorbatch. The Meteorological Team is commanded by Chief Warrant Officer Albert Brown, Jr.



Army's UH–1B (Huey) spews forth 2.75 rockets at the rate of six per second from XM–3 subsystem recently deployed to combat areas overseas.

Huey-Mounted XM-3 Sent Overseas

The XM–3 rocket subsystem, a product of Army Missile Command ingenuity that permits firing of 48 rockets from helicopter-carried pods, was deployed recently to combat areas overseas.

In line with the Department of the Army's Cost Reduction Program, the subsystem is credited with saving many thousands of taxpayer dollars while being developed in less than half the time normally required for a new weapon system.

Prior to deployment of the XM–3, fighting men fired rockets from improvised "slings" or pods mounted on sides of the Army's UH–1B (Huey) helicopters. The homemade pods carried a limited number of rockets, control over the rate of fire was crude, and pilots had difficulty in knowing when the rocket supply was gone.

For deployment overseas, the subsystem was mated with a modified 2.75-inch folding-fin Navy rocket already in use; firepower was tripled and control was made positive. Pilots can now dial a selector knob to fire 1, 2, 4, 8, 12, or 24 rounds at the rate of six per second.

Management of the XM–3 development program was centered in the Army Missile Command's Commodity Office under the direction of Col C. D. Sterner. W. C. Rotenberry, system manager for aircraft weaponization, was assisted by 1st Lt Ron. J. Iekel in the program in which three of the Command's directorates played major roles.

During the research and development program, George Elrod and Larry Nicastro were instrumental in evaluating the possibilities of the many existing components.

In the R&D Directorate's Ground Support Equipment Laboratory, William Watson directed a team of engineers that designed the new launching pads and proved they would efficiently deliver rockets on target.

Locating and procuring the equipment was handled by Capt William P. Menefee, Mae Weeks and Larry Glasscock, working under direction of William C. Wall, Jr., Procurement and Production Directorate.

Watertown Arsenal manufactured the launcher pads; Frankford Arsenal manufactured sighting and fire control components. (See March 1962 issue for preliminary armament firing.)

In the Command's Supply and Maintenance Directorate, Paul Newman, George Birchfield, and Capt Jack Sauer expedited preparation of operator and maintenance manuals, conducted special maintenance training, and organized a team that introduced the new system to commanders of theater areas. They also managed the supply and delivery of the armaments system to the soldier in the field.

With deployment of the XM–3 subsystem, the Army's helicopter armament program has supplied one of its objectives to provide effective striking power for all types of helicopters in support of ground troops under all battlefield conditions.

Air Defense Engineering Center Moves to Redstone

Transfer of the functions of the U.S. Army Air Defense Engineering Center at Fort Meade, Md., to the U.S. Army Missile Command at Redstone Arsenal, Ala., was announced Jan. 31.

Upon inactivation of the agency at its present location, all of the 66 civilian employees will be requested to transfer with their jobs to Redstone Arsenal. A majority of the military personnel assigned to the agency also will move to Redstone.

The transfer is in line with an action in 1963 which transferred to Redstone all Army R&D projects on inertial guidance systems. The U.S. Army Air Defense Engineering Agency has been the Army Materiel Command's principal activity possessing detailed developed and procurement knowledge in the fire coordination field.

Materiel Command spokesmen said the transfer was made to achieve improved efficiency and economy of operation as well as to provide better integration of the overall effort.

Maj Gen John G. Zierdt, CG of the Missile Command, said that the air defense coordination system functions have been placed under Brig Gen H. P. Persons, Jr., deputy CG for Air Defense Systems. Management will be directly under Col B. R. Luczak, Nike Hercules project manager.

Employees who do not choose to transfer to Redstone will be assisted in obtaining continuing employment with Federal, state and local government agencies and by private industry in the Fort Meade area.

Contractor Teams Complete AADS-70s Feasibility Study

Feasibility studies on Army Air Defense Systems for the 1970s (AADS–70s) have been completed by three contractor teams, the Army Missile Command announced Jan. 31, and results are being evaluated.

Contracts totaling $187,500 were awarded to each of the contractors on Dec. 2, 1963, for studies of systems designed to replace in the 1970s time frame the existing Hercules and Hawk air defense systems.

The AADS–70s concept envisions a weapon system that is less complex than the Field Army Ballistic Missile Defense System (FABMDS), which was an earlier concept study discontinued in late 1962 after extensive technical evaluation.

Current effort at the Army Missile Command is under the direction of the Research and Development Directorate. Contract administration is under supervision of the Procurement and Production Directorate.

The contractors who conducted the feasibility studies are Raytheon Co. with International Business Machines and Northrop Aviation; Hughes Aircraft Co. with Douglas Aircraft and FMC Corp.; and RCA with Beech Aircraft Co.

Kudos

Chief of Research and Development Lt Gen William W. Dick, Jr., pins Oak Leaf Cluster to Army Commendation Medal on Lt Col Richard G. Terwilliger of U.S. Army Research Office Staff upon occasion of his retirement from military service. The citation recognized "timely and significant contributions . . . to the Army meteorological R&D program . . . and to organization and the progress of Project HARP (High Altitude Research Project) now being conducted in Barbados, West Indies Federation." The recipient served in the Environmental Sciences Division 18 months.

Maj O. J. Astarita recently received the Army Commendation Medal for meritorious service while serving as assistant engineer for the U.S. Army Support Group in Viet Nam.

Presentation was made at the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., where Maj Astarita is now assigned, by Col J. H. Kerkering, CO of the Labs.

James R. Bolton was cited and promoted to chief of the Fixed Bridge Section of the R&D Laboratories. Outstanding ratings and granted Quality Salary Increases were awarded to Mrs. Phyllis A. Vines and Arthur Berreth.

Other recent USAERDL awards and citations included:

QUALITY SALARY INCREASES —Miss Pina A. Brooks, Edward W. Raska, Vincent J. Bagdon, George M. Illemszky and Frank A. Marciniak.

OUTSTANDING RATINGS—Mrs. Jacqueline A. Cousins, Mrs. Lessie E. Thompson, Mrs. Peggy S. Thomas, Paul L. Whims, James H. Yeardley, Mrs. Betty A. Glass, Gilbert G. Lorenz (his fourth), Mrs. Margaret Mahon, A. J. Vrooman, K. K. Harris, Daniel F. McGafferty, Mrs. Myrtle W. Allen, William H. Carr, and Dr. Hellmut H. Schmid, who is scientific adviser to the director.

CITATIONS FOR WORK, PROMOTIONS—Dr. Georg Hass, John MacClarence, S. B. Swenson, Reuben D. Cook, James W. Gladden, John R. Haff, Morton Stromberg, Ivan R. Jarrett, Franklin R. Norvelle, Lawrence M. Burke, William A. Summerson, Gunga L. Dean, CWO–3 Alvin H. Vollmer, Clifford J. Crandall and Robert A. Matos.

Charles J. Shoemaker has been appointed chief of the Respirator Branch at Edgewood Arsenal's U.S. Army Chemical Research and Development Laboratories. A physical chemist, with a B.S. degree in chemistry from Loyola College in Baltimore, he has been employed by the Laboratories since 1949.

Thomas J. Childers, chief of the Industrial Laundry Branch in the Explosives Division of the Missile Support Command, Redstone Arsenal, Ala., has earned an employee incentive award of $305 for his suggestion that a new flame retardant be used in the Arsenal laundry.

The process flame-proofs clean overalls and smocks used by employees working with combustible elements such as propellants and prevents clothing from blazing in event of a flash fire.

Woman Wins Zornig Award for First Time at BRL

The Zornig Award for 1963, one of the top honors conferred at the Army Ballistic Research Laboratories, Aberdeen Proving Ground, Md., has been presented to a woman for the first time since its creation in 1959.

Mrs. Anna M. Long, administrative assistant to the chief of the Ballistics Laboratory, an element of BRL, received the award Jan. 31 in recognition of outstanding contributions to support of the BRL mission.

Col Charles D. Y. Ostrom, Jr., BRL commander, made the presentation at a ceremony attended by 75 associates and coworkers of Mrs. Long. It consists of a large plaque inscribed with the names of winners and mounted in BRL headquarters, with a certificate and a $100 Savings Bond purchased from a fund contributed by BRL employees.

The award honors Col H. H. Zornig (USA, Ret.) who took charge of ballistic research at the Proving Ground in 1935. He is credited with being largely responsible for organization of BRL along lines which have changed little since laid down in 1938.

Mrs. Long came to the Proving Ground in 1943 as an employee of the Tank-Automotive Division of the Development and Proof Services. She transferred to BRL in 1948 as secretary to the chief of the Wind Tunnel Branch of the Exterior Ballistics Laboratory, and then as secretary to the chief of the laboratory. She also served as administrative assistant to the chief of the Future Weapon Systems Laboratory before assuming her present duties.

Mrs. Long attended Beacon Business College in Wilmington, Del., is the wife of Robert P. Long, a mechanical engineer with the Terminal Ballistics Laboratory, and the mother of two children, Patricia, 11, and Paula Ann, 9.

Anna M. Long, administrative assistant to the Chief of BRL's Interior Ballistic Lab, receives 1963 Zornig Award from Col D. Y. Ostrom, Jr., commanding officer of Laboratories.

Army Heart Pump Wins Prize

Lt Col Timothy G. Barila, Department of Resuscitation, Walter Reed Army Institute of Research, Washington, D.C., recently attended the 17th Postgraduate Assembly in Anesthesia in New York City.

Col Barila, Capt James A. Meyer, and Sp/5 Ralph B. Dixon, all of WRAIR, and Kenneth Woodward of the Harry Diamond Laboratories in Washington, presented two exhibits. The one showing the Army experimental artificial heart pump and a ventilator-assistor with no moving parts (operated by fluid dynamic controls) was awarded first prize.

OCRD Director of Plans, Programs Briefs DIAC

(Continued from Page 13)

For example, he explained, in November and December of 1962 the Army staff provided detailed instructions to the developing agencies on the preparation of their submissions of recommended programs for Fiscal Year 1965. The agencies presented recommendations by late February 1963 in the form of what is called "command schedules," which concentrate on adjustments in the program contained in the President's budget plus the next fiscal year.

A comprehensive Army Staff review of the developing agencies' recommendations then took place, followed by submission to the OSD in May 1963. Major changes to the OSD-approved program were then forecast to the Secretary of Defense by memorandum and later followed by program change proposals (PCP).

As the program was then in the final stages of being approved, initial work was started on the preparation of the budget for FY 1965. The budget estimate was developed in relation to the approved 5-year force structure and financial program and subsequent guidance and was submitted about Oct. 1 to OSD.

Reviews by the Office of the Secretary of Defense and the Bureau of the Budget followed and the estimate was refined and modified. In December 1963, the President's budget was completed and submitted to Congress in January 1964.

Since considerable time elapses between initial developing agency conception and recommendation of the program and actual execution in the fiscal year, the program is reviewed twice in considerable detail prior to execution, once as the target year and once as the budget year.

Because the program is not static, changes are also necessary during the year of actual execution, General Marlin said. These are taken care of through program change proposals and other reprogramming.

The Chief of Research and Development has staff responsibility for planning, coordinating and supervising all RDT&E activities. For each project, an OCRD officer is assigned to keep informed on progress, initiate action as required, and report to OCRD.

Normally, the chief of the developing agency uses his established organizational structure and procedures. Special procedures may be used to expedite the development of selected projects when warranted by the project's cost and criticality.

A management technique being utilized by the Army Materiel Command is that of project managership. The project manager has control of all resources allocated to his project, can call on other elements of AMC for assistance, reports to the AMC commanding general and acts for him.

Fully half of the $2 billion of expenditures under the cognizance of the Army Materiel Command in FY 1964 will be under control and supervision of the 34 project managers, General Marlin said.

Another management technique utilized is that of the in-process review. This is a periodic stock-taking analysis conducted at critical points in the development process to evaluate current status and determine the future course of the project.

A system of Department of the Army system staff officers (DASSO's) also has been established in the Army staff to coordinate, develop and maintain milestone schedules in conjunction with appropriate Army staff agencies and major commands. They prepare periodic progress reports and provide a focal point for up-to-date information.

Criteria for establishing a DASSO for an item or system are criticality, high dollar value, or other high-level management interest. Currently, 26 projects in various stages of development, procurement and deployment have been selected for DASSO monitorship.

"The availability of better management information is of continuing concern to those involved in the R&D process," General Marlin said. A major Army effort currently underway is the Automated RDT&E Management Information System, (ARDIS), to be implemented by July 1.

"ARDIS will serve all echelons from the laboratory at installation level to the Chief of Research and Development and will assist in responding to Defense Department information requirements. Among other data that this system will provide will be information on the key elements of schedule, performance and cost—both planned and actual."

General Marlin then briefly recounted the development cycle: preparation of technical characteristics; preparation of a more up-to-date version of the technical development plan; the project definition phase, centering on scheduling, performance and cost; the engineering concept, design characteristics; fabrication of the prototype for engineer design test and service test before prototypes are produced; and type classification, constituting Army approval of the item for service before final production.

General Marlin concluded his briefing by stressing that the Army is vitally interested in success of Department of Defense relationships with science and industry.

In addition to the recently completed plans for DoD-wide advanced planning meetings, the Army is continuing three existing media to inform industry of Army requirements. They are a brochure, Inventions Wanted by The Armed Forces and Other Government Agencies (published by the Department of Commerce), the Qualitative Development Requirements Information Program, and Unfunded Study Program.

CRD Memo Emphasizes Tri-Service R&D Policy

Chief of Research and Development Lt Gen William W. Dick, Jr., followed up recent meetings with Air Force and Navy R&D chiefs to discuss inter-Service cooperation and coordination by issuing a recent memorandum.

Addressed to all OCRD directors, division and office chiefs, the memorandum on "Policy on Tri-Service R&D Cooperation" states, in part:

"There are in existence many effective means of lateral coordination at all organizational levels between the Army, Navy and Air Force. All have as their goal the desire to achieve the most efficient utilization of available R&D resources.

"Currently, Congressional and OSD actions are requiring that the military services make maximum use of the RDTE efforts of all Services and that any undesirable duplication be detected early in the RDTE cycle.

"It is my desire to foster maximum inter-Service use of RDTE information and effort consistent with essential progress toward meeting the Army's needs.

"Accordingly, it shall be the responsibility of each cognizant staff officer or civilian to keep himself informed of the significant RDTE efforts of the other Services in his area of responsibility and to make appropriate recommendations in keeping with this policy statement. Each of us must be alert to ways and means of achieving better utilization of our RDTE resources."

'Under the Village Chestnut Tree' . . .

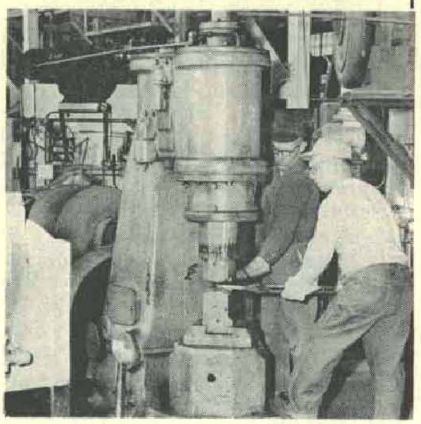
Changing Times Outdating Blacksmiths at Arsenal

Possibly the only Army blacksmith who never shod a horse is Lewis Sears, the last of the blacksmiths at Rock Island Arsenal, Ill., who will celebrate his 50th birthday in March.

When he started work at Rock Island in 1939, Sears and 12 other blacksmiths made jigs, flat die forgings or peculiar-shaped lathe tools that could not be made economically from a die. He still does this work.

RIA or Army Weapons Command scientists and engineers requiring such special tools in research, development or pilot production work on prototype models of weapons have a skilled craftsman assistant in Sears. He usually works from drawings or sketches, translating the often crude conceptions on paper into precise 3-dimensional metalwork.

Plenty of men other than scientists and engineers at the Arsenal depend on his talents. His customers include the railroad gang, the street crew, plant maintenance workers and production personnel, and he averages about 100 tools a day by his own estimate.



Last of the RIA blacksmiths, Lewis Sears (right) forges tool bit on modern drop hammer which gives up to 8,000 pounds of metal-shaping muscle.

With the assistance of other workers, he has forged castings that weighed as much as 900 pounds—"just about everything but horseshoes"—but the bulk of his work is on jackhammer points, drills and chisels.

The swedges he uses to form hot metal into new shapes and the 200 hammers of various sizes, shapes and weights he uses to pound out peculiar shaped tools are the same type that have been used by other blacksmiths for the past hundred years.

A few feet away is a pneumatically driven drop hammer which gives Sears up to 8,000 pounds of muscle. Next to coal and coke-heated furnaces ("fires" in blacksmith language) is a gas-heated "fire" that can heat metals up to 950° F. Some of the metals that he works with, like aluminum and stainless steel, were unheard of when he started as a blacksmith.

Sears got his start in the business in Ipava, Ill., whose present population is about 600. He held horses while his father shod them and "turned the crank" to keep the fires hot. In 1935 he moved to larger blacksmith shops where he sharpened and reshaped plowshares for local farmers.

Twice he has left the Arsenal for other jobs but when he returned in 1953 it was to stay and become the "'last of the Rock Island Arsenal blacksmiths."

NAS Names ARO Scientist to Attend IGU Congress

The National Academy of Sciences has named Dr. Hoyt Lemons of the U.S. Army Research Office staff to serve as a delegate to the 11th General Assembly—20th International Congress, International Geographical Union.

The appointment was announced about the same time that Dr. Lemons, chief of the Geophysical Sciences Branch, Environmental Sciences Division, received word of his promotion to a GS supergrade classification. He has been in the Division since 1957 and became branch chief in 1959.

Listed in *American Men of Science*, the *Directory of American Scholars* and in *Who's Who in the Southeast*, Dr. Lemons has served as treasurer and as a council member of the Association of American Geographers. Author of more than 30 professional journal articles on geography, meteorology, earth sciences and education, he is known best for his climatological research on hail, tornadoes and causes of natural disasters.

The International Geographical Union, formed in Brussels, Belgium, in 1922, is composed of more than 50 member nations and is a nongovernmental scientific organization affiliated with the International Congress of Scientific Unions. Congress sessions usually convene at 4-year intervals.

Because of the broad scope of discussions and reports at the Congress, scientists from sciences other than geography—social, physical, biological and engineering — will participate. Total registration of about 4,000 is expected to include some 500 scientists from the United States.

Papers will be presented in nine sections: geography of population and settlement, economic geography, climatology-hydrography-oceanography-glaciology, biogeography, geomorphology, historical geography, applied geography, regional geography and cartography.

Fifteen pre-Congress and nine post-Congress symposia have been arranged. They will cover urban geography, rural landscape, tourism, Pleistocene geomorphology (two symposia), the tropics, industrial planning, history of cartography, colonization and settlement, agriculture, plants, erosion surfaces, industry, industrial growth, and teaching problems and methods.

Deployment of New Systems Inactivating Corporal Units

Inactivation of selected Army battalions armed with first-generation Corporal missiles has been started by the Department of Defense. Additional Sergeant missile units are being stationed in Europe and the new 175 mm. self-propelled gun is being deployed to both Europe and the Pacific.

In addition, Honest John rocket systems have been deployed. By finding new users for selected Corporal equipment no longer needed by inactivated tactical units, the Army believes it can save American taxpayers millions of dollars on the Corporal missile system alone.

When the modern, improved weapons reach the field, first-generation Corporal and Lacrosse missile units will be inactivated. The deployment of the improved weapons will provide an increase in Army fire support capabilities in both Europe and the Pacific areas.

The program aimed at finding new users for the Corporal equipment is being managed by Col Robert W. Grote's Supply and Maintenance Directorate at the U.S. Army Missile Command, Redstone Arsenal, Ala.

The major items being offered include components of the missile, a mobile launcher, guidance equipment and electronic equipment.

WSMR Marks 15th Anniversary of Epochal Missile Tests, Key to Space Travel

Feb. 24 was the 15th anniversary of a 'marriage" at White Sands (N. Mex.) Missile Range that verified the key principle of successful space exploration and travel.

Two missiles, the 46-foot V–2 and the 16-foot WAC Corporal sounding rocket, were united two days following George Washington's birthday in 1949, and although their life together was short, it was highly successful.

Together—the V–2 firing first and then the WAC Corporal—they demonstrated, for the first time, that a single rocket vehicle with more than one motor could reach previously unattainable altitudes and speeds if the motors were fired one at a time and the dead weight of the spent motors discarded.

Today this principle is exercised in virtually all this country's space endeavors, and it will be the key concept for space travel.

An Army officer, Maj Gen H. N. Toftoy, a colonel at the time, but later the chief of the Ordnance Research and Development Division, first suggested the firing of a 2-stage rocket for increasing the possibilities of upper atmosphere research.

During the 1940s, the missiles that could be used in such an experiment were few and far between. The V–2 was chosen as the first stage because of its great weight-carrying capability and high performance. The WAC Corporal was smaller, reliable and capable of carrying 25 pounds of meteorological gear.

Called Project Bumper, the program was initiated in October of 1946 and began with a thorough study of the problems at hand.

Design of the combination missile had to allow the smaller rocket to fit as deeply into the V–2 as possible without interfering with the V–2 guidance equipment. A means of activating the WAC Corporal's motor simultaneously with the V–2 cutoff had to be found. Guide rails and expulsion cylinders for the second stage had to be fitted within the V–2's instrument section.

On May 13, 1948, technicians of the Army, General Electric (V–2 prime contractor) and California Institute of Technology (WAC Corporal prime contractor) were ready to see if their creation would work.

Success at first was limited. Only a short duration firing of the WAC motor was attempted, and total altitude was only slightly greater than that reached by the V–2 itself.

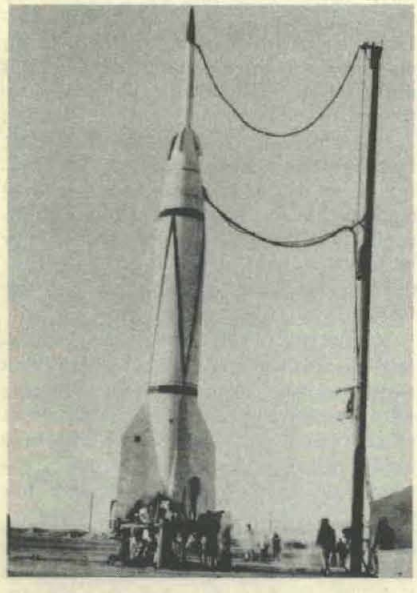
Bumpers 2, 3 and 4 were fired at White Sands at intervals throughout the remainder of 1948 and were beset with difficulties in flight, ranging from premature closure of an alcohol valve (Bumper 2) to an explosion in the V–2 (Bumper 4). None of these three firings was considered fully successful.

The fifth Bumper, fired on Feb. 24, 1949, was historic. The V–2 developed its maximum thrust of 52,000 pounds for a burning time of 30 seconds. At this point, WAC ignited and burned another 45 seconds, capitalizing on the 3,600 m.p.h. speed and altitude already gained by the V–2 motor, and achieved an altitude of about 250 miles above the desert floor and a speed of 5,510 miles an hour—the greatest height and velocity ever reached by a man-made object up to that time.

Instruments aboard the WAC transmitted data on its space environment to the ground during flight, man's first glimpse of space at such extreme altitudes. This telemetered data proved important, for the smashed body of the WAC was not found for over a year and the value of data recorded by recovered instruments was lost.

Bumper 6, fired in April of 1949, was unsuccessful due to excessive vibration in the V–2. Bumpers 7 and 8 were shipped from White Sands to Florida and fired at the Atlantic Missile Range. Their firings completed the Bumper series.

Bumper was the ancestor of today's high performance space vehicles, and as many as five stages in a single missile are no longer uncommon.



WSMR technicians prepare "Project Bumper" missile for historic flight on Feb. 24, 1949, which demonstrated that more than one rocket motor in a single vehicle could result in the altitudes and speeds being achieved today. "Bumper" was a combination of V-2 and WAC Corporal rockets.

MRC Dedicates Symposium to Retiring Director

The Mathematics Research Center, U.S. Army, will dedicate a symposium May 4–6 at the University of Wisconsin to honor Dr. Rudolph E. Langer, MRC director since its inception in 1956, when he retires at age 70.

During the 37 years he has served in the Department of Mathematics at Wisconsin (from 1943 to 1952 as chairman), Professor Langer has gained international renown for his work on advanced mathematics techniques.

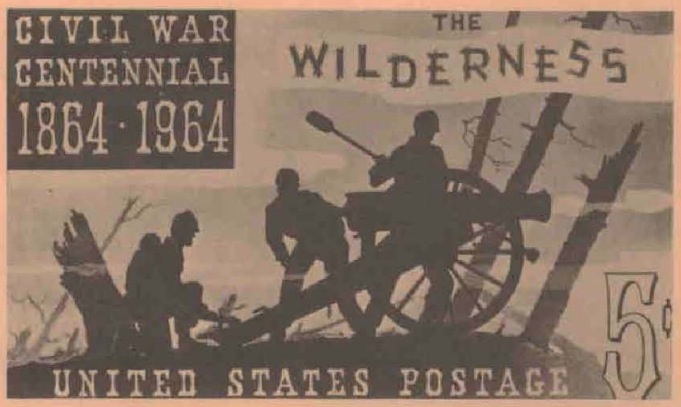
The symposium in his honor, titled "Asymptotic Solutions of Differential Equations and Their Applications," will feature 10 distinguished speakers from institutes of mathematics and technology.

Initiated by H. Poincare and G. D. Birkhoff, the theory of asymptotic solutions was advanced by Dr. Langer with substantial contributions, both to the rigorous foundation and to further development of theory.

Asymptotic solutions of differential equations are an important tool in applied mathematics and theoretical physics, with applications in such diverse fields as boundary layer theory in fluid dynamics, diffraction theory in optics, the theory of thin shells in elasticity, nonlinear oscillations and quantum mechanics.

Speakers on the program will be: Robert A. Clark, Case Institute of Technology; Arthur Erdelyi, California Institute of Technology; N. D. Kazarinoff, University of Michigan; C. C. Lin, Massachusetts Institute of Technology; Robert W. McKelvey, Mathematics Research Center and University of Colorado; F. W. J. Oliver, National Bureau of Standards, Washington, D.C.; Y. Sibuya, University of Minnesota; Hugh L. Turrittin, University of Minnesota; Wolfgang Wasow, Mathematics Research Center and the University of Wisconsin; and Robert M. Lewis, Courant Institute of Mathematical Sciences.

Army R&D Illustrator Wins Contest To Design Commemorative Stamp



An Army R&D illustrator who collects stamps and has long wanted to design one is the winner of the U.S. Post Office Department's Battle of the Wilderness commemorative stamp design competition.

Bernard Harold Christenson, visual information officer at the U. S. Army Electronics R&D Laboratories, Fort Monmouth, N.J., received a $500 award for depicting the bloody Civil War conflict with a drawing of three cannoneers silhouetted against a bleak sky over a devastated battleground.

Postmaster General John A. Gronouski, who announced the award recently, said that Christenson's entry was judged best of 34 designs submitted by nine invited artists. All were finalists in the Battle of Gettysburg stamp design competition last year.

The panel of judges consisted of John Walker, director of the National Gallery of Art; Donald R. McLeod, chief of the Office of Engraving and Plate Manufacture of the Bureau of Engraving and Printing; and William Walton, chairman of the Commission of Fine Arts.

The 5-cent multicolor stamp will be issued May 5 with ceremonies at Fredericksburg, Va. The Battle of the Wilderness takes its name from a dense thicket near Fredericksburg, where the armies of Grant and Lee clashed for the first time. The inconclusive 2-day battle, much of it hand-to-hand, began May 5, 1864.

In his job as visual information officer at the Fort Monmouth Labs, Christenson and his staff of four fellow artist-illustrators do such work as portray new or visualized electronic systems and the way they are proposed to be used by Army field forces.

Three years ago, in recognition of his outstanding work, Christenson was presented the Meritorious Civilian Service Award, the second highest honor the Army confers on civilian employees.

An honorary lifetime member of the Armed Forces Communications and Electronics Association, he designed the AFCEA emblem used in *Signal*, the association's magazine, and has donated his services for other illustrations for the publication.

Christenson also has painted covers, done illustrating work and written articles for *Field and Stream* and other outdoor magazines.

The review stand at Fort Monmouth's Greely Field parade ground was designed by Christenson as a memorial to the men killed in World War II. Currently he is making plans with a Westchester County group to prepare a series of oil paintings depicting the Battle of White Plains, fought in the American Revolution.

Historical studies of the White Plains, N.Y., area began for Christenson when he moved there with his parents as a boy. His parents are deceased but two brothers and a sister reside there.

After graduating from White Plains High School, he attended the Parsons School of Design in New York City and later worked there for several commercial art agencies. His career at Fort Monmouth began in 1946 following discharge from the Army as a captain following four years in World War II.

Interest in stamp collecting dates to his boyhood days, and he has long been a member of the American Philatelic Society. He designed the first trout stamp issued by the New Jersey Fish and Game Division, in 1953, for sticking on fishing licenses.

B. Harold Christenson

As a member of the staff of the New York Chapter of the Audubon Society, he usually makes color photographs of birds instead of painting them. Among his additional hobbies is operating an amateur radio station, with call letters W2KJR.

Watervliet Arsenal Metallurgist Wins Geisler Award

Thomas E. Davidson

Watervliet (N.Y.) Arsenal metallurgist Thomas E. Davidson won the 1963 Geisler Memorial Award, presented Feb. 12 by the Eastern New York State Chapter of the American Society for Metals (ASM).

The award is made annually in recognition of achievements by a young chapter member in the fields of education, research, manufacture or distribution as applied to the metallurgical profession.

In 1962 he received an Army R&D Achievement Award for his work in developing a new method for the application of the autofrettage process in the design and manufacture of high strength, lightweight gun tubes. He delivered the Geisler Memorial Award address Feb. 12 on "The Effects of High Hydrostatic Pressures on the Structure and Properties of Metals."

Chief of the Arsenal's physical and mechanical metallurgy laboratory, he graduated from Lehigh University and received his M.S. degree in metallurgical engineering at Rensselaer Polytechnic Institute.

In 1955 he joined the research and engineering staff of the Arsenal. He has worked in the field of pressure vessel research and extreme pressure metallurgy, and has published several publications in these and allied areas.

Redstone Bids to Set Pace as Scientific Information Center

Redstone (Ala.) Arsenal's new Scientific Information Center is bidding to be a vanguard establishment in pacing the Army's new program for high-speed processing techniques to improve usability of available reports.

That aspiration was clearly evident when the new quarters of the Center were shown during informal opening ceremonies to a gathering of top leaders in the Army scientific and technical information effort late in January.

A source of stimulating pride to scientists and engineers working on the STINFO program at Redstone is the statement made by Senator Hubert Humphrey to the U.S. Senate Oct. 9, 1963: "There is still only one joint NASA-Department of Defense Information Center. . . ."

Referring to the Redstone Arsenal Center as an example of how Federal agencies can cooperate effectively on the STINFO Program, he said it is a model for other governmental establishments to consider.

In its new setting, the Redstone Scientific Information Center is prepared to begin "operating in earnest" to make scientific literature and research reports available to scientists and engineers working on both the national space program and the Army's wide variety of missile systems.

In the terminology being applied to the Army's overall STINFO Program, Redstone is designated as a "Traffic Routing Center," that is, a machine referral center. The high-speed automated system is one of three contemplated, the others being at the Chemical R&D Laboratories, Edgewood, Md., and the Walter Reed Army Institute of Research, Washington, D.C., to serve the capabilities of some 50 specialized technical information centers.

Cleo Cason, chief, Technical Library Branch, Redstone Scientific Information Center, briefs STINFO visitors during tour of new quarters. L. to R. are Dr. Robert B. Stegmaier, administrator, Defense Documentation Center; Fred Koether, Technical Information Office, ARPA; Maj Gen John G. Zierdt, CG, U.S. Army Missile Command; Dr. Karl Pschera, Marshall Space Flight Center.

Maj Gen Ben I. Funk (left) commander, Air Force Systems Division, Maj Gen John G. Zierdt, CG, U.S. Army Missile Command, and Dr. Wernher von Braun, director, Marshall Space Flight Center, pose with Army missile models and Saturn V launch vehicle. Dr. von Braun was one of the principal speakers Feb. 4 at a luncheon at Army Missile Command Headquarters.

Notables present for the open house ceremonies included Maj Gen John G. Zierdt, commander of the Army Missile Command; Harry Gorman, deputy director for administration, Marshal Space Flight Center; Col Andrew A. Aines, director of Army Technical Information, Office of the Chief of Research and Development; Melvin S. Day, director Office of Scientific and Technical Information, NASA; Dr. Robert B. Stegmaier, Jr., administrator, Defense Documentation Center; and Fred Koether, Technical Information Office, ARPA.

The Center is available to scientists and engineers of both the Army and the Marshal Space Flight Center at Redstone. It also serves technical personnel of industrial concerns in the Redstone area which are working on Federal programs.

Administered by the Army Missile Command Directorate of Research and Development, the Center is directed by Fred E. Croxton. Facilities now consolidated on three floors of one building formerly were located in two buildings more than seven miles apart.

In addition to a Library Branch, the Center has a Research Branch, where state-of-the-art searches and literature summaries are prepared; a Translation Branch, where technical documents in many foreign languages are converted into English; and a Programs Branch, which is concerned with developing better, more fully automated information methods.

On the library's third floor, in secure areas, are the most important parts of the collections of classified and unclassified documents, numbering nearly 300,000. Other parts of the collection are in a secure bunker.

The current periodical section has the latest issues of each of more than 2,200 periodicals, many in foreign languages. The library also has an extensive collection of microform texts in microfiche, microfilm and microcards.

Periodicals which are not available in full size, dissertations, the texts of a few books not found in the stacks, and thousands of reports are stored in these miniature forms. Methods to project images for reading or for quick reproduction in full page size are readily available.

Operations at the Redstone Scientific Information Center are attuned to another statement Senator Humphrey made in his Oct. 9 message to Congress:

"The flow of information is not a luxury; it is a 'life and death' necessity; 'life and death' for industries, for communities, for the Nation's economic health, for survival, for deterrence of war, for progress, for prosperity. . . . This is not an exaggeration. It is a hard fact. . . ."